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MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

OCTOBER, 1830.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN JUNE, 1830.

With Remarks and Exemplifications, by the Editor.

1. For a machine for *Boring and Withdrawing the Auger;* John Sneider, Tuscarora, Livingston county, New York, June 1.

A frame is made, in which a round iron spindle, or shaft, is placed vertically, revolving freely in its bearings. The lower part of the shaft is hollowed, so as to form a socket for an auger, the shank of which is also round, and made to turn freely in a hole through an adjustable piece at the bottom of the frame. A trundle, or lantern, is fixed upon the spindle, which forms its axis; the rounds of the trundle are of a length greater than the depth of the hole to be bored, so as to allow it to descend, with the auger, as it is turned by a vertical crown wheel. In order to withdraw the auger, the upper end of the spindle has a spiral groove cut along it, which forms a left-handed screw; by pushing a lever forward, a tooth takes into this groove, and on turning the crown wheel, the auger is withdrawn.

No particular purpose is mentioned to which this machine is to be applied, but it is stated that "if it be required to construct a machine for boring horizontally, and withdrawing the auger, the same principle will apply, by making some alteration in the relative situation of its parts."

2. For an improvement in the *Nail Machine*, called *Reed's Machine;* Jonathan Brett and Elisha Gilmore, Roxbury, Norfolk county, Massachusetts, June 1.

We are not aware of any difference in the improvement now patented, and that for which a patent was obtained on the 13th of last month, (May,) by Joseph Kearsey, of Plymouth, in Massachusetts. The machine upon which the improvement is made, is the same, and the object, and mode of attaining it, similar; there would be something remarkable in this if the patentees were antipodes.

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3. For a *New Method of Blasting Rocks;* Moses Shaw, formerly of Nova Scotia, but now of the city of New York, June 3.

The mode of blasting rocks for which this patent has issued, was described in Professor Silliman's Journal, about a year since, (vol. 16, p. 372,) to which we refer our readers, as the account there given, though brief, is much more clear than the description supplied by the patentee, and the wood cut accompanying the former illustrates the design more perfectly than the very indifferent drawing which makes a part of the latter. The object proposed is to blow off very large masses of rock, by making a number of simultaneous explosions; to effect which a number of holes are to be bored, which may stand round in a circle, and be so inclined as to point to one common focus. A priming compounded of fulminating silver and gunpowder, is to be ignited by a shock from the electrical machine, there being a suitable arrangement of wires made for that purpose.

"Its superiority and usefulness," we are informed, "consists in enabling operators to burst off large masses of rocks, &c. by igniting a number of charges of powder at the same instant: the masses, or blocks, may also be made of more regular proportions than by the common method, and thus save much expense in the hewing of the stone, and in transportation. Much gunpowder may likewise be saved. These are its smaller advantages. Its great usefulness consists in being adapted to the clearing away of obstructions presented by mountains, in the routes of canals and rail-roads, and for this purpose may be of incalculable value to a liberal country."

To remove mountains, either by faith or by works, requires that either should be exercised with a degree of energy beyond the ordinary gauge of us mortals, in the present imperfect state of our moral and physical powers. We know the high anticipations of Mr. Shaw upon this subject, having heard him state them; we, however, were compelled to lag far behind him, probably because we imitate the many who "make mountains of mole hills," instead of exercising the rare talent of making mole hills of mountains.

We wish that Mr. Shaw's specification had been written by some one better acquainted with the subject of electricity, and with the other points necessary to a clear specification of this invention, than appears in the instrument before us. The result of the various experiments which have been made, with a view to the obtaining of a patent, ought to have furnished a more perfect detail than

has been given: at all events the particular points claimed should have been stated, and not left, as it now is, to be collected from the general tenor of the instrument.

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4. For a *Timber Rail-road;* James Stimpson, Baltimore, Maryland, June 3.

We will begin our account of this patent with the *finale* of the specification, or rather of the claim.

"What I claim as my invention, or improvement, in the construction of timber rail-roads, is the elevation above the ground of the road-rails, and the timbers transversely to them throughout the whole length of the road, and their mode of combination, as set forth in the specification; they requiring but a slight support from the earth to keep them in an upright position, by means of the cross timbers being strongly confined to the road-rails, posts, &c. combined with the firm foundation of the road posts, effected by the secondary posts, which are driven into the earth, small stones under the stone blocks, or under the cast iron chairs, either kind to be used alternately, when the elevation of the road, or the nature of the earth may require it. Also the right of driving or sinking separate posts, or piles, from those connected to the cross timbers, whereby I obtain a firm foundation, and its security from decay, by their being sunk sufficiently below the surface for that purpose. Also the right to set posts upon the ground, and sink them alternately, or to step them upon cross timbers with braces, or upon stone blocks, or cast iron chairs, and to drive them deep alternately, for the necessary firmness against lateral pressure. Also the three rail tracks upon three rows of posts, cast iron chairs, and stone blocks alternately, as may be required by the nature of the earth, &c. Also the four rail track, upon three rows of posts, &c. Also the right of extending the cross timbers alternately through both tracks, or not, to save timber, as may be found best, in the four rail track, with four rows of posts, &c. Also the under rails for the one rail track, with the manner of setting the posts upon pile foundations below the surface, and upon cross sills with braces, stones, or iron chairs, alternately. Also reducing the tops of the posts to one size, and cutting the tops crowning; and also the shaping of the under sides of the transverse timbers to conform to the tops of the posts. Also the cast iron chair, or pedestal, secured upon small stones, or solid rammed or pounded earth, for a substitute for wood posts, or stone blocks, whereby the cross timbers and road-rails have a support without touching the earth. Also the right of wide timber rails, to save iron. Also the right of stepping the road posts upon cross timbers, and they to rest upon logs, lying upon the ground lengthwise of the road, secured by braces at different parts of it. Also the extension of posts to an unusual distance from each other, by the application of braces, &c. Also the wedges in the pins, as set forth. Also the two rail track, as set forth in the specification."

The space demanded by the claims will, we apprehend, be thought

quite sufficient, even by those of our readers who feel an interest in the subject of rail-roads; we, however, will add one or two remarks to render the nature of some of the claims more clear. The single rail is to be formed on the principle of one which has been patented and tried in England; the carriage is to hang on each side of the rail, the wheels being above, and in the centre between them; the lower rails spoken of are for lateral friction wheels to run against in case the two sides should be unequally loaded. In double tracks, with three rows of supports, the patentee makes the middle one of the three wooden rails, sufficiently wide for two wheels to pass each other. The wooden rails are to be covered with cast or wrought iron, or else they are to be made very wide, and the rims of the wheels also wide, to prevent their sinking into the rails. The patent in general is taken for things which are so simple and obvious that a man without the least talent at invention would resort to them because he had seen them used for other purposes every day of his life. We refer to such things as supporting an upright post by fastening it into a sill, and bracing it, and putting logs down for a sill to rest upon. If such a patent is good, no man will be left at liberty to follow the dictates of common sense, judgment, or observation, without permission from a patentee. If a post is to be used to support a rail, he will be told that he must not sink it in the ground, place its end upon an iron plate, (chair,) or upon a flat stone; that he is not to use a sill and braces, or employ timber of unusual length, or extraordinary width, as to do so is a special privilege.

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5. For a *Thrashing Machine;* David Flagg, jun. Gardiner, Kennebeck, Maine, June 4.

Instead of one cylinder with beaters, as with most of the thrashing machines, there are to be two. We call them cylinders, although they are not properly so, the beaters being extended along from spoke to spoke, projecting from two hubs upon a shaft, like the rounds of a reel. In using the two revolving lanterns, the bars which form the beaters on one, pass into the spaces between those bars on the other, mashing in like the teeth of a cog wheel. Between these the grain is to be fed by a feeding apron. The beaters are placed one above the other. The claim is to "the application of two or more beaters acting together, as above specified."

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6. For a "*Revolving Cotton Whipper;*" Elisha Baker, Warwick, Kent county, Rhode Island, June 4.

"The essential principle, or plan, of the Revolving Cotton Whipper, and which distinguishes it from the common cotton whipper, consists in the rotary motion, and the machinery connected with this motion, and especially constituting the improvement, are two vertical cylinders placed near each other; each cylinder being covered with projecting points, and these points being so placed on the cylinders, that when the cylinders revolve the points on the respective cylinders will meet and pass each other."

"The operation of the revolving cotton whipper is as follows, viz. power being applied by means of a belt to the pulley on the driving shaft, the two cylinders are put in motion. The cotton is introduced among the whipping sticks, through the hole in the top of the curb; and the extremely rapid motion of the whipping sticks very soon whips, picks, and prepares the cotton perfectly, and discharges it through the opening at the bottom of the curb."

The foregoing quotations comprise the first and the last paragraphs of the specification, and afford as good a view of the structure and object of the machine as can be given without the drawing.

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7. For an improvement in the *Saw Mill;* Eli Mobley, Frederick town, Frederick county, Maryland, June 5.

We do not know in what part of the instrument described the merit of the invention, or the claim of the patentee, is to be found. After describing a machine of considerable complexity, we are told that "the *invention* here claimed is the combination of the several parts to construct the saw mill before described." The law requires that the invention should be made known "in such full, clear, and exact terms, as to distinguish the same from all other things before known," whilst the practice frequently is to obscure the thing by employing such general and indefinite terms, as may suffice to set the imagination at work, but which leave the judgment uninformed.

This mill, we are told, may receive its motion from the power of animals, water, wind, or steam. The saw frame, carriage, feed hand, and many other parts are to be made much in the usual way; but there is to be a cast iron fly wheel, and also a pendulum, in the form of a triangle, vibrating on one of its angles, its lower part being loaded with lead, or iron, and an arm extending above its point of suspension connected by means of a shackle bar, or pitman, with a drum, from which motion is to be communicated by straps to the fly wheel, saw frame, carriage, &c. &c. &c.

We commenced by acknowledging that we did not ourselves understand the merits of the machine, and must therefore claim to be excused if we do not make them known to others; perhaps, however, the light which may be elicited from the account of the operation of the machine may suffice for those who are blest with acute vision.

"*Operation.*—The timber after being properly prepared is fixed on the carriage on the frame: a vibratory motion is given to the pendulum;—this turns the crank which turns the drum;—the drum gives motion to the strap which turns the pulley on the axle of the fly wheel;—this last gives motion to the strap which turns the axle and crank, which move the pitman and frame up and down;—this again moves the carriage by means of the feeder, which is connected with the gate, and the saw which saws the timber."

"The *invention* here claimed is the combination of the several parts to construct the saw mill before described."

Should we ever build a saw mill, we shall carefully avoid the

combination above described, for although we are as ignorant of the forbidden portion of it as the disciples of Mahomet are of the unclean part of a hog, we shall still be safe, because we will never employ a pendulum to drive a crank, to drive a drum, to drive a strap, to drive a pulley, to drive a fly wheel, to drive an axle and crank, to drive a pitman and frame, to drive a carriage, to saw the timber.

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8. For a machine for *Splitting and Manufacturing Hoops for Casks, Pails, Tubs, &c. and for Laths;* Ziba Bisbee, East Bridgewater, Plymouth county, Massachusetts, June 5.

A knife, or cutter, is to be fixed upon an iron bar, lengthwise, and at a distance from it equal to the intended thickness of the hoop. The knife is attached to the bar by bending its ends at right angles, like the cutter of a spoke shave, nuts being used to confine it in its place. A number of small knives, or slitters, pass through the stock from the upper to the under side, at suitable distances, until they meet the main knife transversely, and then divide the hoops into the desired width. Handles, to guide it, are fixed at each end of the iron bar, in the manner of auger handles, and a staple is fastened to the middle of the bar, to which a chain is attached, to draw it along the log, by water, or other convenient power. The whole instrument is considered as new, no part being claimed. The drawing which accompanies the specification is without written references.

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9. For an improvement in *Axle-trees for Wagons and Carriages;* John A. Yerkley, Perry, Genesee county, New York, June 7.

On the 23d of April, 1828, Messrs. Phillips and Mather, of Genesee county, obtained a patent similar both in its object and means, to that of Mr. Yerkley. The specification, with a cut, may be found at page 349, vol. iii. new series. In that axle, the whole of the round part of the axle, which fitted into the nave, or hub, was of cast iron, with the exception of a pin of wrought iron inserted in the end when cast, for the purpose of being cut into a screw to receive a nut, for securing the wheel. These cast iron ends are affixed to a wooden stock by hoops and bolts. In the present instance, a part only, say two-fifths, of the round part is of cast iron, so much of the wood being cut off. The wood is then sawed from top to bottom of the axle, and a piece taken out, so as to leave an opening to receive a strap, or shank, cast on to the round part, and which is to extend back into the stock of the axle-tree, and be secured in its place by hoops and bolts. The lower edge of this strap thus operates as a skein to the wooden part of the axle. A wrought pin is directed to be inserted, as in the specification of the first patent. The present patentee makes no claim, and it really appears to us that the ground occupied by Messrs. Phillips and Mather, leaves him little, or none, upon which to found one.

10. For a "DETECTOR," *to make known a deficiency of Water in Steam Boilers;* Thomas Ewbank, City of New York, June 8.

(See specification.)

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11. For an *Iron Tooth Rake;* Nathaniel Sanford and Erastus P. Parmelee, Meriden, New Haven county, Connecticut, June 8.

The object proposed is to form the head of a rake of iron so that it shall at the same time be cheap, light, and durable. The head is to be formed of sheet iron about $\frac{1}{16}$ inch thick, and two inches wide; the length being governed by the size required. About half an inch of the sheet iron is to be turned back at right angles, along each edge, so that its section will appear thus]. The top of each tooth is to pass through a hole in the lower of these ledges, and to be rivetted into another hole in the upper ledge. In the middle of the plate a socket is to be fixed, for the handle to pass into. It is proposed, sometimes, to bend the sheet iron round, so as to form a tube, through one side of which the teeth are to pass, and be rivetted into holes made in the opposite side. The specification is of considerable length, but these are its leading features.

The claim is to the shaping the piece which forms the head, in the manner described, so as to insure a great degree of strength, with the desired lightness; the teeth having two bearings, or resting places, at the top and bottom, which secures them permanently.

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12. For an *Inclined Plane Wheel, or Projectile Lever Power;* George Wood, Vernon, Jackson county, Indiana, June 9.

The title of this patent is a true indication of its utter worthlessness. An inclined wheel for animals to walk upon, as we suppose, (there being a wheel called the "big tread wheel,") is to carry a large cog wheel, which after three or four other gearings to wallowers, wheels, and levers, is to drive a saw, or any thing else. The drawing is in keeping with the so called *improvement*, the latter violates the established laws of mechanics, the former those of the graphic art.

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13. For a *Plough;* Jacob Yeager, Mifflin Township, Dauphin county, Pennsylvania, June 9.

The wood work and coulter are to be made as usual, but the mould board, and the mode of attaching the parts together, are claimed as novelties. We hear nothing further respecting the *form* of the mould board, but are told that it is cast in one piece with the land side, and are then informed how the heel of the land side, and some other parts, are fastened together.

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14. For a *Stove and Open Fire-place,* for burning anthracite or other coal, connected with a cooking apparatus; Anthony Savage, Pottsville, Schuylkill county, Pennsylvania, June 10.

The claim in this patent is to "the combination and arrangement of the several parts of this apparatus," which combination and arrangement so closely resembles a number of other cooking stoves, as to require more tact than we possess to discover their novelty. There is a grate in the middle for containing the fuel, over which may be placed pots, pans, &c.; an oven on one side, of sheet or wrought iron, with shelves upon which to place dishes, and a flue running round it, for the passage of hot air and smoke; on the other side there is a boiler, with a cock to draw off the water, and a cover to keep out the dust, and, according to the drawing, the whole is to be set in brick work.

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15. For a *Brick Press*, called the "Bridle Brick Press;" Julius Willard, Baltimore, Maryland, June 10.

The brick press, above named, is well described and figured, but its necessary complexity will not admit of our giving any thing like a clear idea of its structure without a drawing. The description and claim both refer, by letters, to the drawing which accompany them. The machine appears to have been well imagined, and, judging only by the evidence before us, we are prepared to hear a good account of its performances.

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16. For an improvement in the *Mode of Sawing Wood for the Fire;* James Hamilton, City of New York, June 10.

There are few things which have been more frequently proposed, than the construction of a "portable sawing machine for fire wood." A little reflection, however, has generally led to the conclusion, that such a machine would not, under all circumstances, prove to be of any real service. However *portable* it may be made, it must be very inferior in this respect to the horse and saw, as usually employed. The present patentee, of course, thinks differently, but he has not succeeded in converting us to his opinion, although he has placed the subject before us by means of a very good description and drawing.

A strong frame must be made to sustain the apparatus. An iron cog wheel is turned by means of a crank; this takes into a smaller wheel, upon the shaft of which there is a fly wheel, and a crank attached to a pitman for working the saw. The frame of the saw, together with the guides within which it slides, are capable of being turned up, to replace the sticks or logs as they are cut. A horse, or buck, (as it is called in New York,) stands upon the frame, to receive the log, which is to be confined upon it by means of a lever. The claim is to the particular mode of construction, as described in the specification.

We have seen an expert sawyer cut eight cords of wood in a day; now we apprehend that the machine described would not effect this with the aid of two men, after it had been hauled to the place of its destination. We greatly err, or the patentee will find that he has expended more thought, labour, and money, on the present scheme, than its returns will justify.

17. For an improvement in *Gasometers,* [Gas Meters;] Henry B. Williams, Baltimore, Maryland, June 11.

Instead of a gasometer, as the instrument is called in the specification, the patent is taken for an improvement in the gas meter. The former is a large reservoir, or vessel, for containing the gas at the works, the latter a small instrument placed in a house, to measure and register the number of cubic feet of gas burned. In the machine generally used, this is done by causing the gas, as it passes through the instrument, to turn a small tin water wheel, which gives motion to a train of wheels, terminating in an index on a dial plate. From leakage, or evaporation, the quantity of water in the instrument is liable to vary, when its indications become inaccurate. The improvement now patented is intended to remove this difficulty, by causing the water always to stand at the same height, which is to be effected by placing a reservoir to supply any waste which may occur.

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18. For an "*Explosion Guard,*" *to prevent accidents from the bursting of Steam Engine Boilers;* Joseph Loughead and Thomas B. Chapman, Philadelphia, Pennsylvania, June 11.

This guard, we are told, "is calculated only for steam boats whose boilers are placed at the side of the boat," and is "simply a strong partition of wood, iron, or other suitable material, open at top, and at the side next the water, and placed between the gangway and the two ends of the boiler." The plan of using strong bulk heads was one of those recommended at the time when steam boat explosions first arrested the public attention. That they would in many instances prove safeguards, is not doubted; but they would have been of little avail in those violent explosions which have torn up the decks of vessels, or have carried boilers, or parts of them, through stone walls. In the placing of boilers on the sides of a boat much is done to lessen the risk to passengers from an explosion, and such guards as are here recommended would certainly lessen it still further, but it would be no easy task to erect a partition which would resist the direct force of such explosions as have frequently occurred. We do not perceive in what the merit of the present invention consists, as it merely proposes to apply upon deck, a security which has been a thousand times recommended between decks.

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19. For a *Thrashing Machine;* John Peters, Harrisburg, Dauphin county, Pennsylvania, June 12.

The cylinder and concave segment are both to be of iron, with teeth cast upon them; the manner of working the machine, the mode of feeding, and, indeed, every thing essential in its structure and operation have the sanction of long usage; the claims, therefore, have to be made upon the mode of fastening it together, and some other things in themselves unimportant, and which may be equally well done in twenty different ways.

20. For *Spring Scales* for weighing merchandise; Daniel Klanberg, City of New York, June 12.

A strip of brass is attached by its upper end to a steel spring, supported on a suitable stand. From the lower end of the strip hangs a scale, into which the article to be weighed is put; this causes the spring to bend, its descent being proportioned to the weight in the scale. To ascertain the amount of this, the strip of brass is graduated on one side, and being made to slide through a mortise in a metallic plate, the weight is read off on the surface of the plate. We have yet to learn in what respect this spring balance is superior to those formerly used, but not approved.

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21. For an improvement in the mariner's and surveyor's *Compass Needle;* Moses Smith, City of New York, June 15. (See specification.)

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22. For a *Washing Machine;* Robert C. Arnold, New Haven, Connecticut, June 15.

A dasher, or paddle, perforated with holes, is made to vibrate in a tight box, by a handle, or lever. At each end of the box is a board which is also perforated; between the dasher and these boards the clothes are to be squeezed until they are perfectly clean. There are certain uncertain claims, for which we have not room at present.

The drawing is without written references.

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23. For a "*Geometrical Protractor and Tablet;*" John Pool, jr. Easton, Bristol county, Massachusetts, June 16.

The above named instrument consists of a quadrant, or other segment of a circle, having a straight limb, or protracting rule, moveable upon its centre. This is to be applied to the edge of a common square drawing board, in the manner of a T square, or rather in the manner of a bevil. A short arm of the straight limb, or rule, furnished with an index, extends upon the graduated segment, and enables the draughtsman to place it at any required angle.

The claim is to "the protracting bar, limb, or scale, connected with, or applied to any segment of a circle, or other geometrical figure, graduated as may be required, and applied to a drafting tablet with the utmost accuracy, for the use of surveyors, navigators, or other geometrical operators, or draftsmen, requiring the correct admeasurement of lines and angles."

Similar instruments have repeatedly been made for the use of draughtsmen. There is one figured in Plate 2nd of Adams' Geometrical Essays, and called a "Protracting Parallel Rule," which is calculated to answer all the purposes of the foregoing, and some others. The late Thomas Whitney, mathematical instrument maker, of Philadelphia, made protracting rules upwards of thirty years ago, precisely like that described by Mr. Pool.

24. For a *Machine for Washing, Cleaning, and Drying of Grain;* Gilbert Arnold, Angelica, Alleghany county, New York, June 17.

The grain is conducted into a vessel in the form of a hopper, into which water is also allowed to run, so as to overflow the vessel, and carry with it the light stuff, whilst the remainder of the grain, with a portion of the water, is delivered at the bottom of the hopper, into a vertical tub, in which a revolving agitator washes it completely; from this tub it runs into a revolving wire screen, inclined like a bolter, by this it is conducted into an iron cylinder, surrounded by mason work, and heated by flues; when delivered from this cylinder it is said to be fit to grind.

The apparatus is pretty well figured, but otherwise very imperfectly described. There is no claim to any part, the whole, as applied, being probably considered as new.

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25. For a *Washing Machine;* Ebenezer Horton, Avon, Livingston county, New York, June 17.

Notwithstanding the strong characteristic resemblance which exists between the leaves of any particular tree, it will be found upon close examination that each leaf differs from its fellow; it has a vein, a notch, or a curvature which marks its identity; if such be the fact as regards the millions of leaves upon trees of the same species, it will readily be believed that the analogy may be extended to washing machines, which are counted by the hundred only. Although in the present instance we have a fluted bottom to a trough, and a fluted roller passing over it with a pendulum like motion, communicated through the intervention of a handle, we much doubt the existence of a machine so perfectly similar, that their portraits could not be distinguished; further we cannot say.

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26. For improvements in the apparatus, and in the process for *Manufacturing or Preparing Soda Water;* George Ott, Norfolk, Norfolk county, Virginia, June 18.

The claim of the patentee will exhibit the nature of the improvements for which this patent is obtained.

"What I claim in the foregoing apparatus, and in the mode of procedure, as my invention, is the manner in which I employ block tin, or an alloy of block tin, to conduct and retain the water, and gas, of soda water, to prevent the deleterious effects experienced from other metals. I also claim the covering of brass, copper, or other metal, with block tin, by fusing, or casting it thereon, so as to leave it in a body greatly exceeding in thickness that produced by tinning. I also claim the expelling of water from the cistern, by carbonic acid, in order that the chamber of condensed gas may consist entirely thereof."

The cistern for containing the soda water is to be made of block tin rolled out, and soldered together; this is to be enclosed in a ves-

sel of wood, strongly hooped, and the heads confined by bolts of iron; the interval between the metal lining and the wood, is to be filled with cement. Sometimes the cisterns are to be made entirely of wood, strongly bound, and lined with an impervious cement. In all cases the connecting pipes, &c. are to be of block tin.

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27. For a machine for *Gumming old, or Cutting the Teeth of new Saw Mills and Cross Cut Saws;* Phineas Newton, Sidney, Delaware county, New York, June 19.

This machine for cutting saw teeth is a species of lever cutting press, which, although it has but little claim to novelty, will undoubtedly answer the purpose intended in a very perfect manner.

There is a bed plate of stout iron, which may be bolted down, horizontally, upon a solid platform. Upon this platform is placed a sliding bolt, with cheeks, or guide pieces, to keep it in its place; one end of the bolt is triangular, and is made of hardened steel; this operates as a punch, or die. A steel plate, supported by a strong iron bracket, stands at right angles with the bed plate, first mentioned, and has a triangular perforation, into which the die fits, and which forms its bed. The bolt is forced forward by a lever, the long arm of which measures 8 or 10 feet, the short one 1¾ inch. A saw passed between this bed and punch may be readily cut. The instrument has no claim to novelty, nor has the patentee preferred any claim whatever.

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28. For a *Furnace for Burning Stone Coal, Charcoal, &c.;* John Estlin, Philadelphia county, Pennsylvania, June 19.

A square box, of sheet or cast iron, is to have an ash pit and grate, is to be lined with fire brick, and should be furnished with a stove pipe, with an elbow, if thought proper. When a fire is made within this furnace, water may be boiled over it, and other calorific effects produced, somewhat resembling those produced in other furnaces of a similar construction. What more can be expected or desired?

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29. For an improved *Vertical Steam Boiler*, for locomotive, stationary, and steam boat engines; Ezra L. Miller, Charleston, South Carolina, June 21.

We do not see any thing of particular novelty in this boiler, but merely an arrangement of the parts varied in form, but not in principle, or object, from many which have been made. The boiler is cylindrical at the part immediately over the fire, then conical, and then again cylindrical, and from three to ten feet in height. From the lower head of the cylinder, pipes descend into the furnace, to allow the flame and heated air to play among them, and to heat the water which they are intended to contain. The flame and smoke have their exit through several flues which pass up in a casing that

surrounds the boiler, and are themselves to be surrounded by water. A main chimney is to be extended up above these.

"The great height of the fire-place, and the division and conducting the smoke and flame, as it reverberates from the top of the furnace to the outside of the boiler, are important parts of this improvement, and are, together with the whole general plan and shape of the boiler, what I claim as my invention."

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30. For an improvement in the *Art of Silvering and Gilding Leather;* Levi Kenton, Philadelphia, Pennsylvania, June 21.

The patentee has not told us what there is new in his process, and we apprehend that there is a very good reason for the omission. The leather is to be sized, or glazed over, is then to be slightly greased, after which the leaf is laid on, and the leather embossed, by passing through rollers, properly heated, in the ordinary way.

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31. For an improvement in the *Construction of Fire-places;* Ebenezer Lester, Killingworth, Middlesex county, Connecticut, June 21.

We do not understand the description given of this improvement, as it is said to be. Within the jambs of a fire-place the hearth is to be raised to the height of two inches above that part without the jambs; upon this elevation two others are to be made, forming a ledge, or step, along the side of each jamb, from the front to the back. Upon these ledges, which may also be two inches high, the wood may be placed; or if coal be burned, a grate may be supported by them. We are then told of an air flue, along the back, between these ledges by which the draft of the fire is to be supplied; but whence this air is to be derived we are not informed.

"The inventor does not hereby claim as his invention fire-places, flues, hearths, nor jambs," (that is well,) "but merely the manner of improving them by the addition of the beforementioned means."

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32. For a *Cooking Stove;* Andrew C. Betts, Westmoreland, Oneida county, and Eli M. Gibbs, Norwich, Chenango county, New York, June 22.

The only drawing given is a wood cut representing the exterior of the stove, which is so similar to many others, that nothing seems to be lost from the absence of sectional views.

The claims are to the particular arrangement of the parts, which arrangement we do not think it necessary to detail.

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33. For a machine for *Grinding or Preparing Clay for Bricks,* and for moulding and pressing the same; Nathaniel Adams, Cornwall, Orange county, New York, June 22.

The clay to be prepared is put into a circular trough made in the usual manner. A horizontal shaft, attached to a vertical one, is

drawn round by a horse. The horizontal shaft is cylindrical, and has upon it a hub, or nave, which revolves round it; from this hub twelve or more spokes project, these are furnished with knives on their ends, and, as they pass round in the trough, the knives cut and prepare the clay.

The press is a rack and pinion press; the bed upon which the moulds rest is brought under the follower, by a rack and pinion working horizontally.

"The follower is made of two iron plates about 6 inches wide each, and about 21 inches long, which are fastened to a bar of iron crossing lengthwise the box, making a joint in the form of a door hinge, or butt, which after pressing all the clay out of the box, will shut up by raising the press, and open again by the spring hooks aforesaid."

"What I claim as my invention is the mode of pressing, and the follower, as before described; likewise the revolving grinding machine, with the knives attached to them."

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34. For an improvement in the mode of *Raising, Straightening, and Laying the Nap upon Woollen Cloths*, and cloths upon which a nap is commonly raised by teasing. Thomas Hurd, City of New York, and Jesse Fox, Lowell, Middlesex county, Massachusetts, June 23.

The machinery for which this patent is taken, is described at great length, and represented in a number of different drawings. The main object of the patentees will be seen by the annexed quotation, which comprises the concluding part of the specification.

"And as metallic wires are set and fixed, in the manner of the common cards, in leather, or felt, at a considerable distance from each other, upon a plane, or upon a cylindrical surface, have heretofore been used for the purpose of teasing and raising a nap upon cloth, it is to be distinctly understood that wires so set, and such cards, and the setting or fixing of wires, or pins, in such manner as last aforesaid, or in any manner in which they have heretofore been set and used for the purpose aforesaid, is not claimed as a new invention; the chief advantage arising from our invention consisting in the setting and fixing of pointed metallic wires, pins, or points, or wires or pins so small that the ends may serve for points with little or no sharpening, in a firm manner in frames, or in or upon metallic plates, or in or upon a metallic substance, or any substance in or upon which they may be set, and fixed with sufficient firmness, comparatively closely, or very nearly together, and much nearer to each other than they have heretofore been placed, set or fixed, in any such cards, leather, felt, or otherwise, so that the points may the better serve as gauges to each other, act upon many points of the cloth at once, require but a light touch, or pressure of the cloth upon them in order to accomplish the work, and without taking such rank hold upon the cloth as to injure it, raise a nap uniformly thereon, with much more facility and expedition, and in a far better man-

ner than can be done by the cards or teazles aforesaid, or any mode or means hitherto in use. And notwithstanding that we have mentioned and recommended the application of heat, steam, and water, in the operation, and described a mode of operating, and machinery which is deemed advantageous in the use of our inventions, but which may be used or not, or varied at the discretion of the mechanic or operator, and which a mechanic of ordinary skill will readily understand, we hereby nevertheless explicitly declare that what is claimed by us as a new invention and improvement, and all which we the said Hurd and Fox claim herein, as our original invention and improvement, is the setting, placing pointed metallic wires, pins, or points, and wires so small that the ends may serve for points with little or no sharpening," &c. &c.

The remainder is a formal repetition of what we have given above, and need not, therefore, be copied.

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35. For a *Thrashing Machine;* Squire Gambell, Onondaga, Onondaga county, New York, June 24.

The usual beaters on a cylinder, a concave segment, and springs to allow for variations in the quantity of grain, are again congregated, and patented. No claim is made. Would it not be worth while to have a printed form for the use of those who wish to patent such machines? there need be but few blank spaces, and according to present appearances, the number which will be required will be, at least, equal to that of the counties in the union.

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36. For *Making Roving in Cotton Spinning*, by means of a machine called a "Speeder;" Samuel P. Mason, Leesville, Middlesex county, Connecticut, June 24.

Those acquainted with cotton spinning are aware that several patents have been taken for *speeders*. The specification of the present refers throughout to the drawings, which are complex. There is no claim, and in such an apparatus this appears to be an essential defect.

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37. For a *Rail-road Carriage*, to be worked by manual power; Joseph V. Hughes, Pottsville, Schuylkill county, Pennsylvania, June 25.

This rail-road carriage is well calculated to give ample employment to the man who is to propel it, as there are 12 cast iron cog wheels, with their proper axles, and two endless chains, each passing over three of these cog wheels, which are geared together to convey motion to the carriage wheels.

The manual power is to be applied by taking hold of a vertical lever, which is to be made to vibrate backward and forward by the man, or men, employed. This lever gives motion to a shaft, which by the aid of two connecting rods, or pitmen, operate upon cranks, acting upon the whole train of wheels, axles, and chains. To aid in the operation, there are two fly wheels "of any convenient size and

weight, to give a uniform motion to the whole, and to carry the cranks past the centre."

"The *invention* here claimed is the whole of the rail-road carriage, as before described, to be moved by manual power."

We think it unnecessary to animadvert upon the general *merits* of such a plan; the mere application of fly wheels to a carriage of this kind gives to it a *nullifying* aspect.

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38. For an improvement in *Finishing Paper;* Thomas Gilpin, Philadelphia, Pennsylvania, June 25.

(See specification.)

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39. For a *Washing Machine;* David Stocking, Scott, Courtland county, New York, June 25.

In this machine there is a cylinder which has fluted rollers on its periphery; a wash board, or bed, made concave, and having rollers on its face, stands in a trough under the cylinder. Both the cylinder and board are borne together by springs. By turning a crank alternately backwards and forwards, with the clothes between the cylinder and the board, the washing is to be effected. There is no claim.

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40. For a *Machine for Churning and for Washing Clothes;* Hezekiah Kingsbery, Hebron, Tolland county, Connecticut, June 26.

Although churns have been patented in numbers, it is some time since the churn and the washing machine have been presented under one claim. On some former occasions the two operations have been so blended in the description as to induce some fear that they might be essayed together; in the present case, although the structures are to be alike in plan, they are to vary greatly in size.

In either case two dashers, hung on pivots, are to be made to vibrate in a conical box, by means of a lever on the top. In the washing machine, these vibrating dashers are to press the clothes against boards perforated with holes.

As there is no claim made, we do not know what the patentee supposes to be new in his churn and washer; we think any further description unnecessary.

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41. For machinery for *Transporting Manure, Sand, and other Earth, by means of a Self-loading Car;* Isaac Beach, Dryden, Tompkins county, New York, June 28.

This is a wagon with machinery attached to it for raising manure, or earth, from the ground, and loading it into the wagon. Why it is called *self*-loading, we know not, as the stuff is to be raised by a windlass, operated upon by a crank. The description of the structure is very obscure, a defect which the drawing does not remove;

we, however, collect this much from it: there is a frame erected above the body of the wagon, to support the cranks and other appendages; two instruments are to be let down, something like two rakes, or rather like oyster tongs, with their teeth towards each other; when down, they are to be opened by hand, and are to embrace a quantity of manure between them; they are then to be drawn up by the crank and windlass, and the manure dropped into the wagon. If it is intended to load sand, &c. instead of teeth, or tines, shovel formed pieces collapse together, and are drawn up. There is no claim.

Were we to animadvert upon this invention, we might perhaps be told by the patentee that we did not understand it; pleading guilty to the charge, we should reply that this is no fault of ours, as our eyes are not so penetrating as to enable us to see through a mill stone before it is perforated. If the machine is a good one, we wish, for his own sake, that the inventor had introduced it to us in a clearer light.

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42. For an *Apparatus for Securing Baggage on Post Coaches,* and other carriages; Charles Stratton, Greenfield, Franklin county, Massachusetts, June 29.

The security proposed to be effected is of two kinds, first, from jolting loose, and secondly, from rain. The first is to be accomplished by using spiral, or other springs, attached to the straps, which by their reaction are always to embrace the baggage closely. The second purpose requires that the baggage should be covered with canvass, prepared by applying a coat of India rubber to it. "This canvass not being original with the subscriber, all that is claimed is the application of it to the purpose of protecting baggage from the weather." There is no claim to the elastic springs. The claim to the prepared cloth, is to the right of applying it to the purpose of keeping out water, a purpose which is the sole intention of its manufacture; how this, therefore, can be accounted a new application we cannot tell.

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43. For a *Thrashing Machine;* Asher Slover and William Sparey, City of New York, June 29.

This thrashing machine is intended, principally, for clover seed; but its general construction is the same with the greater number of those heretofore patented.

A cylinder is to have beaters along its surface, and is to work in a hollow segment, which may be fluted, or checked. The rubbing is to be aided by strips of sole leather, laid along between the beaters. The cylinder and segment are both to be solid, as, it is said "their being in one entire piece constitutes the most important part of the invention as claimed; for the air which is set in motion by the great velocity of the cylinder, instead of passing between the bars, as in the ordinary mode, is condensed within the concavity, and greatly assists the thrashing, particularly of clover seed."

The rubbing floor, or segment, is supported upon spiral, or other springs, which bear it up against the cylinder.

Excepting in the part above quoted, where the beneficial influence of the confined air is mentioned, there is not any thing in the form of a claim. The effect is probably as stated, but in numberless instances the cylinder and the segment have been each made in one entire piece, and important as this may be deemed by the present patentees, it is not new, and any claim to it must stand upon a very insecure basis.

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44. For a *Machine for Spinning Wool*, by eight spindles, or more, called "The Farmer's Handy Maid;" John Pierce, Yorkshire, Cataraugus county, New York, June 30.

There has been a long truce with the "Domestic Spinners," although patents for such machines were issued in numbers two or three years since. Should the present application be the harbinger of an improving state in our household manufactories, we bid it welcome, whether new or old, as we love the bearers of good tidings. Most articles from the spindle and the loom have of late been sold at prices so far below their intrinsic value, as nearly to banish domestic spinning and weaving from the farm house; and, of course, there has been little or no demand for machines like that above named.

Whether this "Farmer's Handy Maid," is really more handy than some other maids and "Jennys" previously introduced to our acquaintance, may very fairly be doubted, as the similarity in its features indicates a great similarity of disposition and habits. These domestic spinners are generally mere epitomes of the larger machines, and such we account that under consideration. There appears to be a strong conviction of this fact in the minds of patentees, as they have rarely attempted to point out the parts which they considered as new. The same course has been adopted in the present instance, no claim being set up. Such an omission must be fatal to a patent of this description, as most of the parts of a spinning machine must be similar to those previously used.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for machinery for detecting and making known a deficiency of water in Steam Engine Boilers. Granted to THOMAS EWBANK, *City of New York, June* 8, 1830.

AT any convenient place on the top of a boiler, a hole is drilled through, and a stuffing box is properly fixed to it, to admit a smooth metallic rod, of about half an inch diameter, to slide easily through it in a perpendicular direction, and without letting out the steam. The length of this rod may be about a foot greater than the distance between the top of the boiler and the surface of the water in it, when at its proper height.

The lower end of this rod is attached to a float properly made to rise and fall with the water in the boiler, and sufficiently heavy to overcome the friction of the rod through the stuffing box. The upper part of the rod, that is, from its top to a little below where it enters the boiler, is made hollow, and a small hole is made into it laterally, or at right angles to its length, near the bottom of the hollow part, and so as to communicate with that part; this hole, which is to be about one-eighth of an inch in diameter, is made at such part of the rod that when the water is at its proper height, this hole may be about half an inch above the boiler; or above that part of it where it comes in contact with the steam; so that when the water sinks half an inch in the boiler, the float and rod will sink also, and consequently bring the small hole inside of the boiler, through which the steam will rush into the hollow part, and escape at top, making known by its noise a deficiency of water within. To increase this noise, a boatswain's whistle, the mouth of an organ pipe, a trumpet shaped tube, or other suitable instrument, may be fixed to the top of the rod, as circumstances may require. The diameter of the rod should be the same throughout its length. The part of the rod outside of the boiler may be graduated, so that by it the depth of water within may be always known; and that as well when it is below the gauge cocks as when it is above them.

When it is desirable to avoid the friction of the stuffing box, I use a rod of the same length, but solid throughout, and about three-quarters of an inch in diameter; one end of this, for the length of ten or twelve inches, I turn down till it is only half an inch in diameter, making that part of it conical where the small part joins the larger; this conical part forms one-half of the valve, the corresponding part is properly fixed to the top of the boiler, with its face inwards, and a hole is drilled through its centre, which admits the small end of the rod to pass through, till the conical part comes up, and thus renders it steam tight. The lower end of the rod is attached to a float, as before mentioned, so that when the water sinks in the boiler, the float and rod sink also, and consequently open the valve, through which the steam then escapes, and gives, by its noise, notice of the fact.

It is to be observed in the construction of this valve, that that part of the rod inside of the boiler, which connects the float to the valve, should be of one thickness throughout its length, and its diameter the same as that of the face of the valve. For if the area of the face, or closing part of the valve, be greater than the rod's diameter, the pressure of the steam upon it, over and above that upon the rod, would be in proportion to this difference; and this pressure would also vary as the density of the steam in the boiler changed; and consequently it would derange the action of the float, and might prevent the valve from opening, even after the water had sunk below the float; and, on the contrary, should the rod below the valve be made larger than the face of it, the steam would have a constant tendency to open it, whatever might be the quantity of water in the boiler.

I claim as new, and as my own invention, in the above described

machine, the hollow part of the rod, with its lateral opening, or openings; also the suspending the float to the moving part of the inverted valve, by a rod of the same diameter as the face of the valve, by which means the float and valve rise and fall with the water in the boiler, uninfluenced by the steam within it. THOMAS EWBANK.

Description of the Drawings.

The corresponding parts in Figs. 1 and 2, are represented by the same letters.

A, A, the boiler.

B, B, the height at which the water ought to be kept within it.

C, C, the surface of the water below its proper level, and bringing the machine into action.

F, F, floats, which may be of stone, or other suitable material. The rods to which they are attached may be connected to a lever, L, and counterpoised by a weight, W, as shown in Fig. 1.

R, in Fig. 1st, represents the hollow rod, passing through the stuffing boxes, with the lateral opening at O.

V, the inverted valve seat, T, the tapering, or conical part of the rod, completing the valve.

Fig. 1.

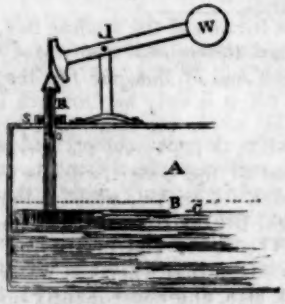
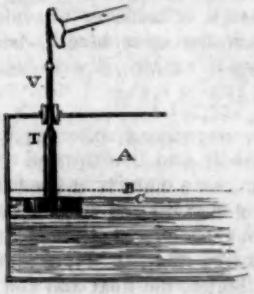


Fig. 2.



Remarks by the Editor.—It has become an object of immense public importance to devise some mode of greatly lessening, should it not be possible entirely to prevent, those fatal accidents from explosion, which have so frequently occurred, especially of late. As the public attention has been aroused to this subject, numerous plans and opinions will be presented to our consideration, and we shall deem it the wisest course to abstain, at present, from any critical remarks upon them individually, excepting in those cases where they appear to be marked with absurdity on their fronts. To others we do not prescribe the same course, but earnestly invite the most free discussion and inquiry upon a point of so much interest.

In our last number, page 157, we gave a description of the plan invented and patented by Mr. Potts, for attaining the same end with the foregoing; the distinctive difference between the two, is the self-regulating action of the supply pump, which Mr. Potts aims to accomplish by the falling and rising of the float in the boiler.

Mr. Ewbank is incorrect in his reasoning about the equality in the size of the rod below the valve, in his second plan; this is a point of no importance whatever; the two forces which operate, are the pressure of the atmosphere without, which will be in the proportion of its weight, and the area upon which it presses; and the elastic force of the steam within, and the area upon which it presses; the former area is the section of the rod, and the annulus of the cone, formed by the space allowed for the escape of the steam; the latter will be what is due to the elasticity of the steam, and the horizontal area of the valve seat.

Any enlargement or contraction of the rod, below the valve seat, will have no more influence upon the pressure of the steam than will the area of the upper surface of the float, the pressure upon which is balanced by the pressure of the water upon its lower surface. The space contained between two circles struck from the centre of the under side of the float, the smaller of which is equal in diameter to the hole drilled through the valve seat, and the larger to the diameter of the lower part of the cone of the valve seat, will represent the area acted upon by the steam, without being counteracted by the atmosphere; from the area of the inner circle must be subtracted the pressure of the atmosphere upon an equal surface.

Specification of a patent for an improvement in the mode of Finishing Paper. Granted to THOMAS GILPIN, *Philadelphia, Pennsylvania, June 25th,* 1830.

I CONSTRUCT a roller, to be made of paper compressed upon an iron shaft, and then turned on the surface perfectly smooth and true, in the same manner as those are made which are used for the callendering of cloth and cotton goods in the usual manner, as well known, and I suspend the same in a frame usually made of iron, with adjusting screws over the Journals, to press down the same and regulate the pressure as required; and I also provide an iron cylinder perfectly smooth on the outside, but so large as to afford room to be hollow in the inside for the admission of heat conveniently; say from four to eight inches diameter, and this said hollow iron cylinder is to be suspended in the same frame as the aforesaid paper roller, and may be put immediately below the same, so that by the pressure of the screws, the paper roller may be let down upon the same, and then, when a power is applied upon a pulley in the well known usual manner, either from a revolving strap or cog wheel, to the said hollow cylinder, or paper roller, as convenience may dictate, the two rollers are to be brought into contact, and will revolve together. Heat may then be introduced into the iron roller by iron or other heaters, or by steam. The paper may then be passed between the two rollers and be pressed, and to obtain this pressure by the said process, consists my said art or invention. The degree of pressure as well as the skill of managing the same, is to be left to the further experience of the workman.

I have also constructed another machine to effect the same purpose of rolling paper, by using two paper rollers in a similar frame to the above, to move together in contact with each other, so as to admit the paper to pass between them, and in this process I either use the two paper rollers together, or I use them with an iron roller between them, as may be most eligible, but the process I consider as analogous to the preceding.

I have found it necessary also to add a useful instrument to the above invention for the purpose of securing the paper, as it is passed between the said rollers, from injury by creasing, or running unevenly, which instrument I call a conductor.

It may be made in a variety of forms, and such an instrument cannot well be done without in this application and process. The form I have used it in, is by having a flat board suspended horizontally upon axles, with two wheels on each side, upon which the paper may be laid. I have then an open frame made to surround the said board, and suspend the same on the two sides or pivots, the end or side of the open frame next to the rollers rests upon the said board, and the other end or side comes underneath the said board, so that it may be pressed up to it by the hand, the end next the rollers will then come down upon the board, and the sheet of paper when laid upon the board is to be shoved, or pushed forward upon it, but under the end of the open frame which is above the board, and by which it may be pressed and gripped, as by a pair of tongs, and kept smooth as it is drawn forward from the conductor into the rollers; this end of the open frame had better be wrapped round with a woollen cloth. The effect of squeezing or pressing the paper evenly throughout the whole sheet, so that it may be delivered in an even manner into the rollers by any process, is part of my discovery, as it has never been done in any manner; and I describe the above as one way I have adopted to effect it. It may be done also by pressing a straight edge or cushion up to one of the rollers, and passing the sheet of paper between the straight edge or cushion, so as to gripe the paper against the roller in order to pass it evenly into the action at the contact of the rollers. Another part of my invention consists in fixing a permanent iron bar, or rod, opposite to the contact or conjunction of the two rollers, so that accidents may be prevented by things going into them, or persons being caught and hurt by them; the said bar to be connected to the standard or sides of the iron frame in which the rollers are suspended. THOMAS GILPIN.

Specification of a patent for an improvement in the Mariner's and Surveyor's Compass Needle, and the mode of using the same, by means of a metallic cap, or feeder, on each side of the centre, and of an electric rod, of brass, or other suitable metal, or material. Granted to MOSES SMITH, *City of New York, June* 15, 1830.

THE needle to be used may be hung in the usual manner; it should be rather heavier than that now in common use: the poles of the

needle should be of a uniform breadth and thickness, with a small point at the extremity, which, in the mariner's needle, may be placed on the end, which should be a little rounded, so as to admit the cap, or feeder, to be placed as near the end as may be. On each pole of the needle should be placed a sliding cap, or, as I consider it, a feeder, to be made of soft iron, or other suitable metallic substance, which may slide, or be moveable from the centre, to the extremity of the needle. This cap may be formed of fine soft iron wire, or other suitable wire, of a size suitable to the needle, and may be of a breadth, computing from the centre to the extremity of the pole of the needle, of about one-sixteenth part of the length of the pole, or of a greater or less breadth as circumstances may require; or the cap may be made of a thin plate of soft iron, or other suitable material of the same breadth.

This cap, or feeder, must surround the pole, in contact with it, and slide thereon, as easily as is consistent with the retention of the place in which it is placed.

When any attraction foreign from the polar attraction occurs, or is apprehended, such as from cannon, or other iron on ship board, or beds of iron ore on land, or from other substances, the caps, or feeders, must be moved as near to the points of the needle as they can go, but not so far as to cover the point. By this the foreign attraction upon the needle is greatly lessened, if not entirely destroyed; and when such foreign attraction does not require to be counteracted, the caps should be moved towards the centre, to render the needle subject to the polar attraction in the usual manner. When the needle is out of use, the caps should be placed at the ends, so as to preserve the magnetic power.

I do not claim any exclusive right, as inventor, to the form or material of the needle, or point, but only to the application of the cap, or feeder, to the mariner's or surveyor's compass needle, and its use as before described. The electric rod for a mariner's compass needle, may be made of brass, or other suitable material, about ten inches long, and a quarter of an inch in diameter, or of any other suitable material, about ten inches long, and a quarter of an inch in diameter, or of any other size which may be capable of giving the shock hereafter described; and the electric rod for the surveyor's compass needle, may be of half the above size, but in other respects like the former.

This rod is to be used for the purpose of putting into action the magnetic power, when the needle has parted with, or lost, any portion of the magnetic power, or becomes variable, or confused in its traverse; and the mode of use is as follows. The needle must be taken out of the compass and laid in a solid position, lengthwise, on a hard plane substance, which substance must be struck with a sharp quick stroke, with the electric rod, close to each side the centre of the needle, which should be held firmly pressed down with the hand. If it be desired to increase the magnetic power, the substance should be struck near to each end of the needle pointed towards the line of direction of the rod; and if the needle be confused, the substance

should be struck near the centre of the needle. This substance may be iron, stone, or firm wood, so that the needle may receive a shock. It is not necessary that the shock should be great, or the stroke heavy, in any case, but it should be graduated according to the defect to be remedied. The stroke should be made with one end of the rod falling flat on the substance to be struck, the hand holding the other end. Immediately after the stroke the needle should be placed on its pivot, when it will take its pole with its former power.

I do not claim any exclusive right as inventor in the form or material of the rod, but only in the application of it in the restoration of the magnetic power of the needle in the manner before described. The electric rod may be applied to the compass needle now in common use, and the caps, or feeders, to any compass needle, the breadth or thickness of each pole being uniform, so as to permit the cap to slide in contact therewith, as before described. When the feeders are slipped near the poles of the needles, this improved needle will show no variation, but take the true meridian any where.

MOSES SMITH.

Remarks by the Editor.—To examine the pretensions set forth in the foregoing specification would be a mere waste of time, and to pass it over without making any remark upon it might induce some of our readers to suppose that some value was set by us upon the notions of the patentee; whilst, therefore, we shall say but little upon the subject, it yet appears necessary to indicate our opinion.

We have not only read the specification, and examined the drawings which accompany it, but we have seen the proposed compass needles, with their *feeders*, and heard the explanations of the inventor, or discoverer, of this improvement, or rather of these improvements. Notwithstanding all these lights have shone upon us, we are still unilluminated. Men of science know that there exists an intimate connexion between the powers of electricity and of magnetism, and recent discoveries have rendered it highly probable that they are modifications of the same agent; their knowledge respecting them is, however, confined to a few facts, not sufficiently numerous to justify the formation of any theory by which they may be connected together. Whilst those who are acquainted with all the known facts are unable to explain and connect them, it so happens in this, as in similar cases, that there are bold spirits who, although they have acquired but half an idea respecting a single fact, are able by the aid of "the stuff which dreams are made of" to draw inferences, and arrive at conclusions, which are far in advance of those who think it necessary to "render a reason."

To any one acquainted with electricity the absurdity of applying its power by what is above styled the electric rod, will be at once manifest; we are of opinion that the whole is in good keeping in this particular, and that the only advantage resulting from the patent will be to the treasury of the United States.

ENGLISH PATENTS.

To Robert Lloyd, *Hatter, and* James Rowbotham, *Hat Manufacturer, for a Hat upon a new Construction.* Dated February 19, 1824.

I, the said Robert Lloyd, do hereby declare, that the nature of the said invention, and in what manner the same is to be performed, are particularly described and ascertained in the following description thereof, (that is to say:—)

The plan or construction of Lloyd and Rowbotham's hats, which is entirely new and their own sole invention, and for which they have obtained his majesty's letters patent, is as follows:—

First, this hat is made, or will be made or manufactured, either wholly or by mixtures of hair, wool, silk, cotton, fur, leather, flax, hemp, straw, or any other materials or material not prohibited by law, nor protected by any patent right vested in other persons; they will also be made from silk, or cotton velvet, superfine or other woollen or linen cloths. Second, the peculiar construction of this hat, and wherein it differs from all hitherto manufactured, is, that the crown is made to rise and fall, so as to assume different heights, and the way it is done, is, that one part of the crown is made to retire, fold, or shut within the other, by which operation the middle part of the crown is wholly taken up, retiring within itself, somewhat like a telescope: thus it is, that the same hat may be worn as a high crown or a low crown, and in the latter case the folding or spare part is taken up, so as to be completely out of sight; it is this peculiar way of folding, which is entirely new, that the patentees, Lloyd and Rowbotham, claim as their invention. Third, although the materials with which these hats are or may be made, will generally be put together or manufactured in the usual manner of hat making, there is one way or method which the patentees have adopted, and which they believe never has been done by any other person, viz. instead of making the body of the hat, or the hat altogether in one piece, they have done, and will, for greater facility, cut out two or more flat pieces of felted cloth, woven cloth, woven fur or furs, or any other material or substance, and sew or join them together; in or from which state, the said joined pieces may be strained or blocked to the shape wanted. Fourth, for the purpose of raising and lowering, or folding and supporting the crowns of Lloyd and Rowbotham's new invented hats, they will use the various apparatus herein described and numbered, 1, 2, 3, and 4, viz. No. 1, or diamond jointed prop: this is made of metal, bone, or wood, and (see margin) the centre or extremes of each diamond, by working on a pin or pivot, is capable of being drawn out to any given length, and again shut up or compressed into a smaller compass or space, so

No. 1.

as to allow the crown of the hat to rise and fall, from its greatest to its lesser height. Those diamond joints will be fixed inside the crown of the hat, to prop or support the same, and to each hat will be attached one, two, or more, as may be required; although it is intended, that every prop on this plan shall have three diamond joints, yet a lesser or a greater number may be used; one end of this prop will be fastened to the top of the crown, inside, and the other end at or near the band.

No. 2.

No. 2, or corkscrew joint, is a piece of metal wire, bone, or wood, (see margin,) bent, so that the two ends meet; between those ends is placed a small roller, of metal or hard substance, with teeth, or indented: this roller is placed between the ends of the bent wire by a pin, so that it may work round, and the teeth or indenture act as stops, to keep it in the situation required, the whole acting upon the principle of a corkscrew, to each end of which is fastened a small piece of wire or other hard substance, and may be called arms, one end of which will be attached to the inside of the crown, at the top, and the other end near the band. Of these joints there will be one or more to each hat, and the roller joint will allow the crown to be put up or down as wanted.

No. 3.

No. 3, or hoop, is a hoop of a metal or other hard substance, to which is fixed two or more metal wires, wood, or bone uprights; the hoop to be nearest the top of the crown, and passing through several eyes or loops; and the other ends of the uprights to be fastened near the band of the hat. At each end of those uprights will be a moving joint and swivel, so that each will have two distinct motions with this apparatus, fixed inside the hat; the crown, on being pressed down, forces the hoop to slide partly round through the eyes or loops, until the crown is pressed down to the depth wanted, the uprights falling also, and one over the other; but when the crown is wanted to be raised, the uprights or props assume a perpendicular state, when a small spring hasp in the hoop will keep the crown from falling down.

No. 4.

No. 4, or telescope sliding joint. This joint or prop is made of metal, bone, wood, or any other hard substance, in the following manner: two or several pieces are made with sliding grooves, so that one joint or piece may be pulled out over the other to any given length, and each joint will fasten with a snap, spring, or catch; one, two, or more of these being fixed inside the hat, and fastened to the top and bottom of the crown, will allow it to be compressed and raised as required. There are many other methods by which these hats may be supported and worked up and down, and of which the patentees mean to avail themselves; such, for instance, as a spiral spring or springs; one or more straight pieces of metal, bone, or wood, to

take out and fix in as required, without or with joints or springs, to allow of the crown of the hat being raised or shut down at pleasure or for convenience. The patentees, for the support and folding of these hats, mean also to use two or more pieces of wire, bone, or wood, placed in a transverse direction, so that one-half being made to pass through or turn within the other, will force the crown up and let it down as required, for convenience, or as fancy may direct: in short, this hat is to be folded down and raised in the crown by means of a spring or springs, prop or props, made of bone, wood, steel, iron, brass, or other metal or metals, which are to work or turn on a pivot or pivots, hinge or hinges, sliding groove or grooves, pin or pins, screw or screws, joint or joints.

We are at a loss to discover any utility, or even any thing rational, in this description of a "hat on a new construction:"—if, indeed, among the other variations of fashion, we were condemned to wear our hats a yard or two in length, and to encumber our heads with a few pounds of metal springs, this valuable invention might obtain some repute: it was probably in anticipation of such an event that Messrs. Lloyd and Rowbotham obtained their patent.

We should have refrained from publishing this specification, had we not had several inquiries respecting the nature of the patents obtained by Mr. Lloyd; the former is inserted in our 8th vol. p. 660, present series. [*Rep. Pat. Inven.*

To HENRY ROBERT SALMON DEVENOGE, *Gentleman, for certain improvements of machinery for Making Bricks. Communicated by a foreigner.* Dated May 8, 1830.

IN this machine, two cylinders, coming in intimate contact with each other, are constructed, with a series of cells or moulds for the bricks, of a proper shape, extending around their surfaces. Each cylinder (according to those shown in the drawings of the specification) is represented as being long enough to admit of the moulds of three bricks placed lengthways, and the whole circumference is such as to contain twelve rows, an intermediate space being left between each row alternately, of the size of the width of the bricks; thus, at each revolution of the two cylinders, seventy-two bricks will be made.

The cylinders, which have their axles placed on the same plane, are caused to revolve in reverse directions by means of pinions, that communicate with a shaft or handle, turned by hand or other power, and their relative arrangements are such, that the spaces beforementioned, between each row of cells on one cylinder, are opposed to the cells themselves on the other. These spaces are directed to be made either of segments of circles, or of any other convenient shape, so as to form similar depressions on the surfaces of the bricks, against which they are necessarily made to press by the revolution

of the cylinders. These depressions or cavities are intended for the reception of the mortar or cement employed in the course of building.

At one extremity of either cylinder, and at a short distance from the axis, a triangular tumbler is placed at the end of each row of moulds, which being acted upon during their rotation by a small wheel or roller, properly stationed for that purpose, and turning horizontally, causes a movement of the lower part of the moulds, and facilitates the discharge of the bricks on to a revolving floor, composed of a series of battens or planks, placed transversely across three endless leather bands, which pass over and again under a like number of rollers, placed at equal distances, to support and extend them. Another small wheel acts in a contrary direction on the tumblers, after the discharge of the bricks, and re-places the moulds in a proper position for the reception of a fresh supply of clay. By these means the use of sand is dispensed with; but in the event of its being deemed more expedient to employ it, a sieve is placed above each cylinder, which will distribute the necessary quantity on the bricks in their passage under them: a hopper is fixed between the two sieves, through which is passed the clay, and the latter is pressed into the moulds by means of a weighted cover, regulated by a lever proceeding from the top. The cylinders are caused to approach or recede from each other when a greater or less pressure is required, by means of screws, properly arranged for that purpose near the axles; and these revolve in suitable bearings. The whole machine is directed to be firmly affixed to standards of iron or other strong material, inserted in a flooring which may be placed on wheels, to render it more portable. [*Ib.*

To SAMUEL WRIGHT, *Gentleman, for a manufacture of Ornamental Tiles, Bricks, and Quarries for Floors, Pavements, and other purposes.* Dated January 26, 1830.

THIS patent consists, first, in the manufacture of tiles, bricks and quarries in various shapes and sizes, from the finer clays and other materials used for working porcelain and earthenware, (instead of from the coarser materials generally employed for that purpose,) and in so combining and firing such clays as to produce a solid semi-vitrified substance, which, it is stated, will be more durable than marble or stone; and secondly, in ornamenting such pavements with various devices and patterns; as coats of arms, crests, patterns of carpets, oil cloths, or Roman tesselated pavements.

To effect the latter, the clay is, in the first instance, impressed with the intended device, by means of a stamp, made of gypsum or plaster of Paris, enclosed in a casing of metal to protect the sides, and by giving it additional strength, to enable a greater pressure to be borne, so that a good and perfect impression will be imparted to the clay. The countersunken impression thus formed, is then filled up with clay, prepared and coloured according to circumstances, with metallic oxides. When the whole is sufficiently dry, it is cut

or ground down to a proper level by a machine that we will now proceed to describe:—

A square cast iron box, having its upper edges made of steel, to prevent its wearing by the friction of the cutting instrument, is furnished with a sliding metal platform, on which the bricks or tiles are to be placed, and this is raised or lowered by the following contrivance:—at each corner of the box is a female screw, in which works a metal pin, having a small cog wheel at its upper extremity; these four cogs are turned simultaneously by a large cog wheel, placed in the centre, and revolving on a vertical shaft, which latter is impelled by a winch, communicating with it by cogs properly arranged for that purpose. By these means the platform can be raised or lowered any distance required, and will remain perfectly stationary until the winch is turned, although in cutting, considerable stress is exerted on its surface by the cutting instrument. The platform, it is observed, should be previously ground quite true and parallel with the steel edges of the box; and the tiles, after being cut, will be found perfectly level, and presenting a smooth and regular surface, leaving the full impression of the pattern. The cutting instrument itself is not described in the specification, nor is the situation denoted in which it is to be placed, but we presume, from the allusion of the patentee to the steel edges of the box, that the blade of the instrument is intended to be in that position. [*Ib.*

To WILLIAM HALE, *Machinist, for a machine or method of Raising or Forcing Water for Propelling Vessels, which machine or method is also applicable to other purposes.* Dated January 12, 1830.

THE patentee states his invention to consist in a vertical or horizontal air-tight paddle box, kept constantly supplied with water, the sides of which (except at an aperture for the escape of the water) being forcibly acted upon by a paddle wheel or propeller, we are told, will propel the vessel to which it may be attached, in a direction contrary to that in which the water is expelled.

The paddle wheel, or propeller, used in this machine, consists of one or more curved paddles attached to spokes, proceeding from an axis, placed eccentrically in a circular paddle box. The paddles vary in size, according to their number and the extent of the discharging aperture, before noticed; that is to say, if one paddle be used its area must be equal to that of the aperture; if two be employed, the area of each must be half the area of the aperture, and in a like ratio for a greater number.

The spokes are fixed at an angle in the centre of the surfaces of the paddles, in order to prevent any vacuum behind; and the distance of the axle from the centre of the box is so regulated, that the paddles in their revolution, come nearly in contact with the side of the box opposed to the discharging aperture; whilst the eccentric space between them and the latter, is equal to twice the distance of the curve of the paddles.

The water to be acted upon, is admitted into the box when placed vertically, by four circular holes made at the side; and when employed horizontally, a supply pipe in the same situation is to be immersed in the water, through the bottom of the vessel. In this instance, the apparatus is directed to be placed about the midships, with the discharging aperture in the direction of the stern; a stout flooring having previously been prepared for its reception. When employed vertically, two paddle boxes are required, as in steam boats in general use, care being taken that the discharging apertures be placed parallel with the keel of the vessel. A modification of the apparatus is also shown in the drawings, in which are two discharging apertures; the size of the paddles being regulated accordingly.

This is a summary description of Mr. Hale's propelling apparatus, as contained in his specification. In what way he intends it to move, or by what means it is to raise water or be employed for other purposes, we presume he considered to be matters of so little importance, that he has left them entirely unnoticed. We leave our readers to define them. [*Ib.*

To WILLIAM STRACHAN, *Manufacturer, for his having invented or found out an improvement in the making or manufacturing Alum.* Enrolled October, 1828.

IT is a well known fact that the alum of commerce has hitherto in this and other countries been principally, if not wholly, manufactured from substances which contain combined naturally two of the constituents of that salt, the sulphuric acid and the alumine. It is also equally well known, that the green sulphate of iron (the copperas of commerce) is manufactured from the decomposable sulphurets of iron, commonly called pyrites, and that this is effected by exposing these sulphurets to the action of the air in a heap, (called by the copperas manufacturers a bed,) by which means a decomposition takes place, which being encouraged by rain and the throwing on of water, a liquid sulphate of iron is produced, which, after evaporation to a certain point, and saturation with iron, is allowed to crystallize, and forms the green sulphate of iron, or copperas. Now my invention or improvement consists in the making available for the manufacture of alum, the sulphate of iron, whether in the state of the raw liquid sulphate of iron, so used hitherto for the making of copperas, or of the crystallized sulphate of iron, or copperas of commerce.

Before I proceed to describe how I effect this, I will for the benefit of those persons, if such there be, who are not acquainted with what is by the copperas makers called a "bed," describe what I consider the best mode of forming one.

The ground on which it is intended to stand should, in the first place, have a low wall built round it, about eighteen inches high. This must be puddled and rammed with such a covering of clay, as

will be sufficient to form a water tight bottom. The bed should have a considerable inclination or slope, in order that the liquor may run from it as quickly as it attains the bottom. The clay should be covered with bricks, flags, tiles, lead, or other substance capable of resisting the action of sulphuric acid, and the top of this last covering being even with the top of the wall, the whole forms a sloping, even surfaced platform. Upon this platform the pyrites are to be piled up or deposited, but I consider it is adviseable before depositing the pyrites, to lay a course of good sized round pebble stones, in order by raising the pyrites from the bottom, to admit air under, and consequently, through the pyrites, by which the decomposition will be greatly expedited, water being from time to time thrown over the pyrites; the liquid sulphate will be given out, and must be received in a cistern or other convenient receptacle at the bottom. The thicker the pyrites are heaped up, of course the stronger will this liquor run from the bed, which bed should, however, be six feet thick at the least. The size or superficial surface of the bed must of course be proportioned to the wants of the manufactory; the shape I do not consider a matter of much moment, though I prefer an oblong parallelogram, the slope falling to one of the longer sides, over the bottom of the "bed," of which shape the liquor will have a shorter distance to run, and consequently the chances of loss be diminished.

I must here state that I do not claim the "bed," or the above method of forming one, as any part of my invention, for the purposes of which the pyrites may be placed in any other plan, manner, or form, as may be considered best and most convenient for effecting their decomposition, the foregoing instructions being only given as a description of what I consider the best mode of exposing the pyrites, for decomposition, and obtaining the greatest quantity of the resulting liquid sulphate of iron. Supposing, therefore, a supply of liquid sulphate of iron, arising from the decomposition of the material pyrites of iron, however placed for the purpose of decomposition. Or if from any circumstances it shall be deemed preferable to use it, the crystallized sulphate of iron, or copperas of commerce to be at hand, I proceed in this order to make the sulphate of iron (in either state) available in the manufacture of alum, I procure a quantity of aluminous clay, or earth, or other substance, containing alumine as white and as free from iron as possible, and also as clear from gravel and other contaminating matter, as is to be had.

I have from experience found the light gray coloured clay shale found among the coal mines, answer the purpose extremely well. Whatever aluminous substance may be used, it is adviseable, by grinding with rollers, pounding, or some other such method, to reduce it to an even degree of fineness; but this is not absolutely necessary, and I practise it only as a means of making lighter the labour. In the next part of the process this aluminous matter I ultimately mix and impregnate with a quantity of the liquid sulphate, arising from the decomposition of the material pyrites of iron, or of the crystallized sulphate, or copperas of commerce, and submit the

mass or matter so impregnated to the action of heat. This may be done in a furnace, kiln, oven, or other convenient contrivance, by putting the aluminous matter therein, and when there, and while under the action of heat, throwing in, or otherwise applying, the liquid sulphate of iron, or other aluminous matter which may first be mixed and impregnated with the liquid sulphate of iron, and then thrown into the furnace, kiln, oven, or other contrivance, and there subjected to the action of heat, until it is thoroughly dried and calcined.

I should observe that when the crystallized sulphate of iron, or copperas of commerce is used, it may be employed either in the state of crystals, or it may first be dissolved in water. If, in the state of crystals, I should recommend a small quantity of water to be thrown upon the mixed clay and crystals when in the furnace, in order to assist the water of crystallization of the copperas, in disseminating the sulphate more evenly through the mass. When the impregnated clay is sufficiently calcined, it will have assumed a pale red colour, and is to be raked or drawn out, and in a cistern, or other convenient receptacle, lixiviated by being covered with water, and from time to time stirred or plunged up. When the water has extracted from the impregnated matter or substance, all its available strength, which it will have done in about three days, it will be formed into a liquid sulphate of alumine, varying in strength in proportion to the strength of the liquid sulphate of iron, and the quantity of it employed to impregnate the aluminous matter, and the quantity of water used to lixiviate the calcined aluminous substance after it has been so impregnated. This liquid sulphate of alumine is now ready to be converted into the alum of commerce, by being combined with the alkali, and treated in the usual mode adopted by the manufacturers of alum, from the materials in common use.

The effect of this process of impregnation, calcination, and lixiviation, is this, the iron being by the heat so far oxidized as to have become insoluble, the sulphuric acid, the other constituent of the sulphate of iron, seizes on the alumine contained in the matter or substance with which it was mixed, and forms the sulphate of alumine which is dissolved, taken up, or rendered liquid, by the water with which the impregnated mass is lixiviated.

Having thus stated the combination of which my invention consists, I shall proceed to describe the apparatus, and method I have adopted for applying those principles to practice; I pass the clay, earth, or other aluminous matter I intend using, through iron rollers, and when sufficiently crushed and prepared, I throw about thirty hundred weight into the furnace.

This consists of a common arched reverberatory oven, about nine feet long by six feet wide, having at one end a fire-place, extending the whole breadth, and separated from the floor on which the matter to be acted upon is placed, by a bridge or midfeather; at the other end is the chimney; in front are three springs with sliding iron doors for charging and discharging the furnace, and stirring the contents during the operation. The fire I keep at a moderate heat, un-

til the clay, earth, or other aluminous matter is dry, when I proceed to throw in the sulphate of iron upon the aluminous matter, stirring the mass up with rakes; this is continued until the whole dose of sulphate (which may be from four to five hundred weight if the crystallized be used, or from one to two hundred gallons, if the liquid) is thrown in, when the fire is urged higher, the raking being continued, adding from time to time water, when the crystallized sulphate is used, until the impregnated clay, earth, or other aluminous matter is quite dry, and so calcined as that the iron which was contained in the sulphate of iron, is so far oxidized as to have become insoluble. When this is effected, which may be known by the mass having assumed a highly reddish colour, it is made to undergo lixiviation; for this purpose, I have a row of stone cisterns about two feet deep, and each of sufficient capacity to contain one charge of the oven or furnace, and as much water as will cover it well; I have also one general receiving cistern, so placed as to receive the liquor from all the extracting cisterns.

The impregnated and contained clay, earth, or other aluminous matter, is, when sufficiently calcined, raked out of the oven or furnace, and put into one of the extracting cisterns and covered with water; after remaining for two or three days, being stirred and plunged up frequently, it is let off into the receiving cistern, and is now ready for evaporation. Instead, however, of immediately running this liquor (which is the liquid sulphate of alumine) into the evaporator, I think it desirable, in case the strength should be less than fifteen per cent. above water, (which will depend upon the strength and quantity of the sulphate of iron used) that the liquor should be returned over freshly impregnated matter, until it has attained that strength.

The boiler I use for evaporation, and which I have found very effective, is an arched chamber, twenty-two feet long, seven feet broad, and three feet deep from the spring of the arch, formed of stone, and arched with brick, having at one end a fire place, extending the whole breadth, separated from the body of the chamber, by a water tight bridge or midfeather. This boiler, chamber, or cistern being filled with the liquid sulphate of alumine, to within a few inches of the top of the bridge or midfeather, the flame or heat radiates down from the arch, and sweeps over the whole surface of the liquor, taking the steam produced with it up the chimney in a continued stream, the evaporator being supplied with fresh liquor as the water is thrown off.

This is the contrivance I use, but of course any other method may be pursued as thought best. During the concentration, the alkali (the other constituent of alum) is to be added. This may be either the muriate of potash, the sulphate of potash, potash itself, or any other salt usually employed by alum makers, though I prefer the first. I consider it best to allow the evaporation to proceed until the liquor is concentrated, to from thirty to thirty-three per cent. above water, before adding the alkali, the proportion of which will be the same as commonly used by alum makers, and must of course

depend on the quality of the alkaline salts employed. When the alkali has been added, the concentration is to be carried on till the liquor has attained the strength of from thirty-five to thirty-eight per cent. above water, it is then to be let or drawn off into coolers, for crystallization; at the end of about ten days, the mothers may be drawn off, when the alum will be found in crystals in the cooler. These crystals are to be washed, re-dissolved in clean water, and again crystallized, and thus repeated.

It is now pure alum and fit for all uses to which alum can be applied, but as alum is generally sold in large masses (the process of forming which is called "rocking") it may for this purpose be again dissolved in a small quantity of water, as will at the greatest degree of heat, which can be communicated to it, take up in solution, and run it into casks or tubs so constructed as to be easily taken to pieces and again set up; in these it should remain from ten to fourteen days, when the mothers may be let off, the casks taken to pieces, and the alum broken or cut up into pieces for sale.

I must here observe, that the clay, earth, or other aluminous substance, which has been impregnated with the liquid, sulphate of iron may, after being lixiviated, serves for the same purpose, for a considerable number of times, varying with the quantity of alumine contained therein, originally, until the whole alumine has been taken up by the successive applications of the sulphate of iron, and also that the mothers of the first and all the subsequent crystallizations may be used over again without limit, I must also observe that all the vessels and apparatus used in the manufacture, must be composed of materials capable of resisting the action of sulphate.

After having fully described the whole course of my mode of manufacturing alum, using for the purpose of such manufacture from the sulphate of iron here, to prevent mistake or misconception, explicitly state and declare of what my invention and improvement consist. I do not claim as my invention the "bed," or the mode of forming one, I have pointed out. Nor do I claim as my invention, any part of the apparatus or process by which the liquid sulphate of alumine is converted into the crystallized alum of commerce; what I do claim as my invention, and an improvement in the manufacture of alum, is the new combination in making available in the manufacture of alum, the sulphate of iron, whether in the state of the liquid sulphate, resulting from the decomposition by exposure to the air and water, however they may be placed for that purpose, of the decomposable sulphurets of iron, commonly called pyrites, or of the crystallized sulphate of iron or copperas of commerce, by producing from the same, combined with clay, earth, or other substance containing alumine, a liquid sulphate of alumine, which being treated with the usual mode adopted by alum makers, may be formed into alum for the purpose of forming this liquid sulphate of alumine; I do not intend to confine myself to the apparatus, or mode of using the apparatus I have before described, or to any other particular apparatus or process, but do for this purpose claim and assert my right to extend to all and every apparatus, by which may be effected the object re-

quired, namely, the mixing or impregnating aluminous clay, earth, or other substance containing alumine with the sulphate of iron, in either state, exposing the clay, earth, or other substance so impregnated, to the action of a heat, sufficient so far to oxidize the iron, as to render it insoluble, and by means of water dissolving, taking up and forming the liquid sulphate of alumine. [*Lond. Journ.*

FRANKLIN INSTITUTE.

Monthly Meeting.

The stated monthly meeting of the Institute was held at their Hall on Thursday evening, August 26, 1830.

Mr. S. V. Merrick, was appointed chairman, and

Mr. F. Fraley, recording secretary pro tem.

The minutes of the last meeting were read and approved.

The following donations were presented to the Institute, viz.

By Mr. Henry Troth.

Accounts of the Corporation of the City of Philadelphia, from December 23, 1816, *to January* 1, 1828.

Statement of the Expenditures of the City Commissioners for the years 1817 *to* 1829, *inclusive.*

Reports of the Watering Committee to the Select and Common Councils, from Nov. 1, 1802, *to Dec.* 31, 1829.

By Isaac Hays, M. D.

Leçons de Chemie Appliqué a la Teinture faites à la Manufacture Royale des Gobelins.

By Mr. W. P. Farrand.

Mr. Everett's Address on the Second Centennial Anniversary of the arrival of Gov. Winthrop at Charlestown.

By James J. Barclay, Esq.

The Second Annual Report of the House of Refuge.

By Mr. S. C. Atkinson.

The Casket, from January to August, 1830, *inclusive.*

The corresponding secretary laid on the table the following works, received in exchange for the Journal of the Institute, viz.

Recueil Industriel, for March and April, 1830.

Bibliothéque Physico-economique, for May and June, 1830.

Journal Universel des Sciences Médicales, for February and April.

Annales de Chimie et de Physique, for February and March.

Bulletin de la Société d'Encouragement pour l'Industrie Nationale, for January, February, and March.

London Journal of Arts and Sciences, for June, 1830.

The Repertory of Patent Inventions, for June.

Gill's Technological and Microscopic Repository, for June.

Boston Mechanics' Magazine, for July and August.

New York Monthly Magazine, for July.

Southern Agriculturist, for August.

The Southern Review, from February, 1828, to the present time.

The committee appointed to engross the rules and regulations of the reading room, and to report rules for the government of that class of the library intended for circulation, presented a report which was read, and ordered to lie on the table until the next monthly meeting.

S. V. Merrick, *Chairman.*

F. Fraley, *Recording Secretary pro tem.*

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Observations on Wooden, or Frame Bridges. *By* Col. S. H. Long.

The subject of trestle, or frame work, and wooden viaducts as substitutes for high embankments and stone bridges, has been much agitated in different parts of the country, and especially among those interested in the Baltimore and Ohio Rail-road. Doubts have arisen in the minds of many as to the propriety of adopting wooden structures instead of their more substantial rivals of stone in connexion with rail-roads, under any circumstances. These doubts have had their origin in the numerous examples of unsteady, flexible, and unsubstantial frame bridges, which are to be met with in almost every part of the country. The impression uniformly entertained, that a structure for the support of a rail-way, must be firm and unyielding, is no doubt correct, and well founded: while the impracticability of giving to a structure of frame work the character just mentioned, by the ordinary modes of construction hitherto adopted for wooden bridges, &c. is equally obvious and certain.

The defects observable in structures designed for the purposes above intimated, and especially in those intended for the support of rail-ways, as also the injurious consequences to which they give rise are briefly as follows, viz.

1st. The extent of the base or foundation on which the trestles rest is often much less than is necessary to insure firmness and stability to the superstructure, which is, in consequence rendered far more liable to derangement from the shocks and strains to which it is unavoidably exposed. The length of the trestle sill, transversely of the road, or longitudinally of its foundation, should be at least equal to two-thirds the height of the structure.

2nd. The mode of bracing the trestle or frame pier is often defective and inefficient. The braces are frequently arranged in such a manner that the thrust or resistance communicated by them is met by no other counteraction than that imparted by the stiffness or inflexibility of the beam or post with which they are connected. This must be regarded as a defect totally incompatible with firmness of structure, and should be studiously avoided. The remedy is simple and obvious, and is at once suggested by a recurrence to the principle denominated the "parallelogram of forces." The brace is represented by the diagonal, the posts by the ends, and the sill and beam by the sides of the parallelogram. The action of the brace, whether by thrust or tension, should be communicated to the sides

and ends of the parallelogram in such a manner as to resolve itself into, or be counteracted by two forces acting at right angles to each other, and at the same point. A wooden brace should generally act by thrust, consequently the post, and beam, or stile, that receives its action should act by tension. From the principles here adverted to, it may be inferred that stiffness can only be insured in a braced trestle by braces and counter braces, the heads and feet of which are firmly connected by ties, also that a trestle cannot be rendered firm and unyielding when the braces meet the posts, beam, or sill, at points unconnected by ties in the manner just explained.

3d. The spaces or spans between the trestles are generally greater than is compatible with the requisite stiffness in the rail timbers. It is believed that the points of support for wooden rails should never be more than ten feet asunder even when the rails are 14 inches deep. The object of thus limiting the span is to prevent any perceptible yielding, or even trembling of the rails during the passage of the heaviest loads. Any want of efficiency in this respect will obviously be attended not only with a loss of motive power, but with an increasing liability to derangement in the joint and other parts of the structure.

In case a greater span should be necessary, the enlargement should be effected in a manner that has never hitherto been adopted, so far as we have a knowledge of the subject. A system of framing analogous to that exemplified in the Jackson Bridge, hereafter to be more particularly noticed, may be advantageously adopted in the following manner. Let the span be 24 feet, divide this distance into three equal parts, and from the two points of division intermediate to the span, let braces pass downwards at a suitable obliquity to the trestles. Connect the trestles by one or more string pieces, or ties, attached to them at the points where the feet of the braces are inserted. The thrust of the braces downward will by this means be resolved into horizontal and vertical action in the direction of the trestle post, and any yielding of the parts of the structure situated between the trestles will be effectually prevented.

If it be required to extend the span through a distance of 40, 50, or 60 feet, the system just adverted to is susceptible of a modification adapted to such an extension by simply introducing the posts, main, counter, and lateral braces as contemplated in the plan of the bridge above mentioned. By this means an unyielding support will be afforded to every part of the structure.

4th. As a means of conducting rail-ways across deep vallies, rivers, &c. bridges of a span much greater than those above mentioned are frequently required. In these, firmness and stiffness are no less requisite than in the smaller structures above considered.

The systems of bridge building most extensively adopted in the United States are those devised by Wernwag, Burr, and Towne; the two former involving the principle of the arch, as a means of support; and the latter a sort of lattice truss work of timber, in which a system of bracing and counter bracing, which may be re-

garded as essential to stiffness in a bridge of any considerable length, is displayed and applied to much advantage.

With respect to the wooden arch, as a means of support, it may be affirmed with truth that however well its adjustments, it is not susceptible of any arrangement, by which a load upon one of its quarters (or between its crown and either abutment) will have a tendency to depress the opposite quarter; or by which a load at the centre of the bridge, will not have a tendency to thrust outward, both quarters. Hence, from the nature of arched structures of wood, the actions are neither equal nor uniformly in the same direction, and cannot be effectually counter united in such a manner as to prevent a vibratory movement, as the result of any change in the position of a load sustained upon the arch.

With respect to Towne's bridge, its mode of construction is such as to ensure the requisite stiffness, so long as the trenails, by means of which the braces are confined to each other and to the strings of the bridge, remain unimpaired, and the holes in which they are inserted, unenlarged. The great strain, however, to which these parts are unavoidably subjected, and their inability to resist, without injury, the storms and shocks to which they are exposed from the rapid passage of heavy loads upon the bridge, render fixtures of this description very objectionable, and quite incompatible with stability and permanency of structure.

The plan upon which the Jackson Bridge is constructed, is without doubt better calculated to insure the objects last mentioned, than that of any other bridge we have ever seen. In this a system of bracing and counter bracing has been introduced, by means of which a load resting upon any part of the bridge between its supports communicates a downward thrust, to all parts included within the same span. Like Towne's plan, it is dependant on its braces, exclusively, for its support and stiffness. But the thrust of its braces is received upon steps or shoulders in the posts, furnished with thin plates of sheet iron, or even tin, by which a metallic bearing is given to the parts exposed to the greatest strain, instead of trenails, as in the plan just before considered.

The system embraced in the Jackson Bridge is such, that the braces all act uniformly in the direction of their axes, and exclusively by *thrust*. Their connexion with the truss frames is such as to preclude any action by *tension*. Moreover the adjustment of the counter braces provided for in this work of construction is attended by a peculiarity, of which bridge architecture has never before furnished an example. The peculiarity alluded to, is, that the counter braces, by means of wedges or keys at their heads, are made to perform the office of forcing downward, or loading the bridge in such a manner that the strain to which it is subjected by the passage of the heaviest load, is no greater than that exerted upon it without a load. By this means the elasticity of the truss frames is so effectually counteracted, that every appearance of yielding is entirely excluded from them.

A structure possessing these properties cannot fail to recommend

itself to the consideration of those who may be interested in the adoption of the most firm and substantial mode of constructing bridges. Nor is the simplicity and economy displayed in the construction of the Jackson Bridge less conspicuous than its firmness and efficiency.

For a more particular account of this bridge, see the Journal of the Franklin Institute, for April, 1830.

On the comparative expense of covering the Roofs of Houses with different materials. Abstracted from an Essay on Architecture in the United States, published in Silliman's Journal, vol. 18, page 234.

THERE is one practice among us most destructive to property, and yet strangely suffered to exist almost without comment. I refer to roofing with pine and oak shingles. The frequency and extent of fires in our cities are proverbial: their extension is caused, in nine cases out of ten, by our wooden roofs. We feel their dangerous character, for in case of fire, our first attention is always directed to the roofs of the neighbouring houses; here our apprehensions fix themselves most keenly, and on them the engines most unremittingly play. "If the roof can be saved," is the universal cry, "all is safe." Is it not most strange, then, that people will still continue the practice of roofing with such combustible materials, or that if they will do so, the state authorities do not interfere and put a stop at once to the evil? The practice, so dangerous, often so widely destructive, cannot even plead economy in its support. I have received from an eminent architect in New York, some very valuable memoranda, showing the comparative expense of various kinds of roofing in that city, which will furnish us with some useful data: I regret that our limits will not allow me to lay the whole before the reader.

The following will show the present prices of roofing in that city, and the time each kind will last.

	Prices.	Time which they will last on a roof inclined 26° 30′
20 In. white pine shingles, in three thicknesses, laid on white pine boards, with square edges, per 100 superficial feet,	from $7 to 9*	from 20 to 25 years.
30 In. white cedar shingles, in three thicknesses laid on oak laths, the laths 1 inch by 2 1-4 inches,	" $10 to 12	" 35 to 40 "
16 In. Welsh slate, laid on 1 1-4 inch plank, with square edges, close and leaded at the ridge,	" $12 to 14	" 35 to 40 "
16 In. Welsh slate, laid on oak laths, and plastered between the laths with lime and sand mortar, and leaded,	" $14 to 16	" 40 to 45 "

* These prices include the expense of boarding, lathing and plastering.

Tile laid on oak laths 1¼ inch square, and pointed on the under side between the laths, with lime and sand mortar,	"	$12 to 15	" 60 to 70 "
Common bright tin, with grooved edges, laid on 1½ inch white pine plank, ploughed and grooved, the grooves of the tin first put together with white lead and well beat down,	"	$18 to 20	" 25 to 30 "
16 Oz. sheet copper, (or one pound to the square foot,) with grooved edges laid on 1½ inch pine plank, grooved as above,	"	$35 to 40	" 55 to 60 "

From this it appears that Welsh slate, even when imported, is in the end, exactly as cheap as pine shingles, while the expense of tiling is only about half as great. Slate has been found in our own country, and extensively wrought, but its quality I believe is not equal to our severe winters, and the Welsh slate is still preferred. But we know not yet half the resources of our country, and if encouragement were given, slate of as good a quality as any from abroad, would probably be found. A correspondent in Baltimore informs me that a company has been formed in that city, which has undertaken to supply the inhabitants with slate, at as cheap a price as that of shingles. Doubtless the price of slate may be greatly reduced, should its use be encouraged, and the subject is one worthy of immediate attention among our civil authorities. In Boston, I understand a law exists, that no house above a certain height shall be covered with shingles: there may be such laws in other of our cities, but I have not heard of them. There is none in Baltimore, nor any ordinance encouraging the use of slate. In that city about 30 per cent. of the houses are covered with slate or tiles, and about a dozen with copper or tin. In New York the number of slate roofs is about one-half of the whole. Tiles were much used in the latter city, about forty or fifty years since, but are now seldom employed, chiefly on account of their weight and clumsy appearance. They might be made a very cheap article. In the south of Europe, and in Turkey, they are universally employed, and in one of these cities where I gave the subject some attention, a sufficient number may be procured to cover one hundred square feet, for one dollar and thirteen cents. Their appearance will probably prevent their use to any great extent in our cities: any thing, however, is better than pine shingles. The destruction of property which they cause among us is immense. It is impossible to estimate the whole amount, but some idea may perhaps be formed of it, from the fact, that the aggregate amount of loss paid by the insurance companies of New York for the last four years, as reported to the legislature in February, was 2,085,000 dollars.

Remarks by the Editor.—To the general correctness of the foregoing observations on the security derived from incombustible roofing but few will object, yet we do not admit its universal truth. As respects security from fire, such a roof defends a building from the danger of its being communicated from without, through the roof; which, in situations where the supply of water and the means of ap-

plying it, are not ample, is frequently the most imminent; but this does not apply to the city of Philadelphia, and we fearlessly assert that in that city a house with a shingled roof is more secure than one with a covering of metallic or earthy materials. There, the instances of the communication of fire from one house to another by the roof, are very rare; the supply of water is so abundant, the hose and engines are so numerous, and the fire companies so well organized, that the roofs of houses adjoining those on fire, are immediately deluged with water, and combustion rendered impossible.

We have witnessed there several proofs of the injurious effect of incombustible coverings on buildings in which fire has originated, and will mention two. The house of Mr. Samuel Richards was covered with sheet iron; a fire commenced in the upper part of it, which would have soon made an opening in a roof of shingles, through which the water would have been admitted to the fire, but being confined by the iron, the destruction produced by it was greatly increased. The printing office of Mr. Jesper Harding was roofed with slate; at the time it was burnt, the loft was occupied as a bindery, and a large portion of the building and of the property contained in it would have been preserved but for the slating.

We are not acquainted with any other city, to which this exception would apply, as we do not know of one in which the means of extinguishing fires bear any comparison with those provided there; the value, therefore, of the information contained in the foregoing extract will not be lessened by any thing which we have said.

On the manufacture of Red, Green, Yellow, and other Enamel Colours.

[Translated from the *Dictionnaire Technologique*, for the Technological Repository.]

Red.—This is a primitive colour, that is to say, it is not formed by a mixture of other colours; it is generally obtained from iron. There are plenty of processes for making it; some consist in calcining the sulphate of iron, others in oxidizing native iron, by the aid of a strong heat and the contact of the atmospheric air. But the following is the manner of procuring the most beautiful red.

We must procure a quantity of steel, the best and finest which can possibly be had; the old blades of English razors are very good for this purpose. These must be broken into small pieces, and be introduced into a matrass containing sulphuric acid diluted with water. The solution may be made in the cold, but much better and quicker by the aid of heat. When it is effected, the solution must be poured into a porcelain basin, and be evaporated on a sand bath, until the liquid has attained a certain degree of concentration; it must then be exposed to the open air, when crystals of sulphate of iron will be formed. When these have attained a proper size, they must be taken out of the mother waters, and be placed upon a leaf of paper to be washed.

After the sulphate has been well purified, it must be dissolved in

about three times its weight of distilled water, be filtered through paper, and evaporated a second time. It will then form, on cooling, crystals of the sulphate of a beautiful emerald green colour, and very transparent. After these have also been well washed and dried, they must be enclosed in a wide mouthed bottle, with a ground stopple to it.

When we would prepare the red colour, we take one part by weight of the sulphate, and a quarter of a part of sulphate of alumine (alum,) and grossly powder them, in order the better to mix the two salts; on the other hand, we make a charcoal fire in a calcining furnace, and when it is of a good glowing heat, we place a plate of thin sheet iron upon the coals, on which we have previously laid the two powdered sulphates. The aqueous fusion of the two salts takes place at the same time, but the mixture is at first white, and then reddens: we should, therefore, take great care not to make the fire too strong, lest we cause this red tint to fade. Finally, when we perceive that the colour is uniform throughout, we remove the plate from off the burning coals, and leave it to cool, and we may distinctly perceive that the more it approaches to the temperature of the atmosphere, the finer the red colour is developed.

Nevertheless, as we may always find in the calcined mass, certain parts of the oxide of iron where the red is of a more agreeable tint than in other parts, so we may select them. We deposit these selected pieces upon a glass slab, moisten them with distilled water, and grind them with a glass mullar until we have reduced them to a very fine powder. When this is effected, we remove the colour with a palette-knife, and place it in a porcelain vessel, when we wash it repeatedly with hot water, decanting the water each time; finally, we dry the residuum in a gentle heat.

In order to make known the reason for adding a fourth part of the sulphate of alumine to one part of the sulphate of iron, we must say that it is not because the colour becomes thereby finer and more intense; on the contrary, the alumine, by the white tint natural to it, tends to deaden the clear red which the iron manifests; but as that colour is extremely fugacious, the alumine by its refractory property, gives it a certain fixity which it would not otherwise possess; so that although this last substance predominates in the composition, yet the red colour is more fixed, although less intense. But we must not proceed beyond the due limits in this respect.

This red is greatly employed in vitrificable painting; it is used in imitating many flowers and fruits: it also forms entire draperies; it likewise enters into the tints destined to imitate the carnation, such as in certain parts of the lips, the corners of the eyes, &c.

The alkaline fluxes are not proper to be mixed with this red colour; the metallic fluxes are much better. This colour is one of those which spread readily under the pencil, and as it receives a large quantity of flux, so it is greatly used upon glass, enamel, and porcelain.

Of flesh coloured enamel.—This colour, whose name is sufficient to demonstrate that it is very useful in this kind of painting, is also

made with the sulphate of iron; but instead of only using one-fourth of a part of the sulphate of alumine, as in the case of making the red colour, we mix two, three, and even sometimes four parts of it; so that, as we know that the alumine is a white substance, the red becomes paler accordingly in notable proportions, and we thus obtain what are termed *flesh colours.* We here also perceive, that in virtue of the refractory quality of the alumine, we are obliged to introduce in the flesh colours a greater quantity of the above mentioned fluxes; nevertheless experience has pointed out in a peremptory manner the theory for the best mixtures.

Green coloured enamels.—These colours may be obtained from two metals, copper and chrome. The following is the manner of procuring it from the first of these metals.

We choose the finest rose copper which can be had, make it very thin, and cut it into small bits, which we dissolve in two or three times their weight of nitric acid, diluted with water. We must take care to introduce the metal a little at a time, in order to prevent a too great effervescence taking place, and lest we should risk the sudden loss of the oxigen in the acid. We add the metal as we see the action is terminated, and thus continue until a perfect saturation is obtained; finally, we place a crucible in a wind furnace, and heat the crucible by placing burning charcoal around it; we then pour into it about a fourth part of the contents of the solution of copper. When the liquid receives the impression of the fire, it swells and mounts towards the upper part of the crucible. If it threatens to escape, we must direct the wind from a pair of hand bellows into the midst of it. This precaution hinders the loss of the liquid, and it instantly falls to the bottom of the crucible.

When the evaporation of the quantity first poured in is completed, we add another portion of the solution, always taking care to put in but a little at a time, for the reason above assigned. We thus continue the process until the whole quantity is poured in, when we cover the crucible, and carry the calcination to a red heat. At the end of a quarter of an hour's firing, we take out the crucible, and let it cool. When we take it in the hand, with a steel knife, whose point is a little rounded, we remove the oxide of copper, which appears in the form of a very black powder, and in a state of extreme division, unless the fire has been too violent, in which case the oxide will be of a gray colour, and its molecules become agglutinated, and attached to the interior of the crucible, so as to make it difficult to remove them. This circumstance is an inconvenience which it is better to avoid by employing a moderate fire.

Potash and soda also precipitate copper from the nitric solution of it; but then the precipitate is of a bluish green colour: by calcination it becomes black. We may employ either of these two processes, but must observe that the first is that constantly used.

The oxide of copper affords a fine green colour when it is vitrified with fluxes; but it is a little difficult to use with the pencil. Nevertheless this colour is indispensable, it furnishes those tints which

are peculiar to it, and which the oxide of chrome, of which we shall next speak, is incapable of affording.

Another green colour produced by the oxide of chrome.—This oxide is obtained by the decomposition of a stone, which is named chromate of iron. This stone is of a bluish gray colour, and often black. The following is the manner of treating it, in order to procure the green oxide of chrome.

We pulverize the stone in an iron mortar, and pass the powder through a very fine sieve; it is then mixed with a little less than its own weight of the nitrate of potash, also pulverized. The mixture being intimately made, we fill a Hessian crucible two-thirds with it, and place it in a wind furnace; we then cover the crucible, and heat it. We should observe that we must take care to apply the fire by degrees. As the matter begins to become red hot, we perceive a movement to take place throughout the whole mass; the nitrate of potash is decomposed, and there escapes from the mixture, between the cover and the upper edges of the crucible, a great quantity of azote, in the gaseous state. The residuum in the crucible consists of the chromate of potash, alumine, silex, and the oxide of iron.

The operation may last from half an hour to three-quarters of an hour, with a continued fire: at the end of this time the crucible is withdrawn from the furnace, and left to cool; it is then broken, and its contents pulverized. This powder is then mixed with four or five times its weight of water, in a copper vessel, and placed upon the fire. After boiling for a quarter of an hour, the water is decanted, which will have assumed a fine golden yellow colour. We filter this water through paper, and again put it into the copper vessel, in order to cause it to dissolve what little chromate of potash may still remain in it; we filter this as before, and repeat the process until the water is no longer coloured yellow.

On the other hand, we dissolve in the nitric acid a certain quantity of mercury: when the solution is effected, we pour the nitrate of mercury into the solution of chromate of potash, when there will fall a precipitate of a red colour, which is more or less lively, according to the degree of purity of the two solutions; we decant the supernatant water, which ought to be limpid and colourless, instead of yellow, as it at first appeared. We then wash the red deposit which is found at the bottom of the vessel: this is the chromate of mercury.

We proceed as follows, in order to procure the oxide of chrome, which we extract from the chromate of mercury with which it is mixed. We put the chromate, whether dry or not, into a crucible, place it in a furnace, and urge the fire. By this operation the mercury, by reason of its volatility, escapes from the composition, so that at the end of a quarter of an hour, there only remains the oxide of chrome in the crucible, in the form of a light powder, very much divided, and of a fine green colour.

If you would avoid the loss of the mercury in this operation, you must place the chromate of mercury in an earthen retort, to the

beak of which an adopter must be luted, with its recipient, in order to condense the mercurial vapours.

If you would not obtain the green oxide of chrome by the distillation of the mercury, you may procure it directly by mixing the chromate of potash with double its weight of flour of sulphur, and subliming it over the fire. In this operation the sulphurets and the sulphites of potash are formed, which may be dissolved out by hot water, and the oxide of chrome be set at liberty. In this last manner the green colour may be extracted from the chromate of iron; and we believe the process is performed by many persons.

This oxide of chrome is very fixed; it bears the great heat of a porcelain furnace without being neutralized; and it can thus be successfully employed to make the plain foundations of the vases intended to be decorated with gold. The tints of green may be varied at pleasure, either by the addition of a little blue, or a little yellow. These colours are but rarely vitrified before using them, which renders them exceedingly easy to spread with the pencil.

Of yellow coloured enamel.—This is also a primitive colour, and is procured from several metals, such as antimony, lead, tin, and also silver. The following is the mode of procuring the oxide of antimony, which serves as the basis of a yellow colour of different tints.

They reduce the regulus of this metal to a very fine powder, and pass it through a sieve; they also pulverize the crystallized nitrate of potash (or the nitre of commerce;) they then take one part of the regulus of antimony, and one part and a half of nitrate of potash, and mix the two ingredients intimately; they then place a crucible, formed of good clay, in a furnace, with a good draught, and project into it, a little at a time, the mixture of antimony and nitre. At each spoonful of the matter introduced into the crucible, there is a considerable movement of the mass exhibited; this motion is accompanied by a vivid and brilliant flame; this is extinguished by adding a new quantity of the matters; and the process is continued until the crucible is become nearly full, when it is covered, and a brisk fire is kept up for a quarter of an hour. At the end of this time the crucible is withdrawn from the furnace, broken, and the heavy mass which adheres to it detached; this is pulverized, ground with water on a glass slab, and then placed in a porcelain vessel, where hot water is poured upon it many times. Thus the excess of potash is washed out, and the white oxide of antimony remains at the bottom of the vessel; this is termed washed diaphoretic antimony.

When we would fix this yellow colour by fire, we combine, with one part of this oxide of antimony, one or two parts of the red oxide of lead, or minium, and mix the two oxides perfectly; we then place them in a crucible, and introduce it into a laboratory furnace; we give it a slight degree of fire, but continue it for three-quarters of an hour, after which we withdraw the crucible, break it, and find the mixture converted into a fine rich yellow colour.

We can easily, by the same means, obtain yellows, more or less coloured; it is sufficient to know, that for this end, the more the oxide of lead predominates, the paler will the colour of the yellow be.

We can also prepare a very beautiful yellow colour by mixing in a similar manner, with one part of the white oxide of antimony, a part and a half of the acetate of lead (white lead,) and one part of the hydrochlorate of ammonia. We pulverize these substances, sift them, and put them upon a test, which we place in a calcining furnace, and make a fire sufficiently intense to decompose and sublime the hydrochlorate of ammonia. When we perceive that the operation is terminated, which is manifested when not an atom of smoke rises; and the composition also appearing of a yellow colour, we withdraw it from the fire, leave it to cool, and wash it in a large quantity of water.

We can also form another yellow with two parts of the white oxide of tin, one part of minium, one part of the sulphate of alumine, and half a part of the hydrochlorate of silver, which the older chemists termed *lunacornea*.

[TO BE CONTINUED.]

On an Improved mode of making Plaster of Paris.

[Translated from the *Dictionnaire Technologique*, for the Technological Repository.]

THIS plastic material is obtained by calcining and reducing to powder the native sulphate of lime, or gypsum. The sulphate of lime is known under the name of plaster stone, and is found, in general, on the upper parts of the secondary formations, but sometimes on the tertiary ones. In the first, it forms thick couches interposed with calcareous beds; in the second, it forms deposits, more or less extended, and accompanied by clay or marle: it is thus found in the neighbourhood of Paris, where it forms a considerable object of commerce; the department of the Seine alone consumes about five millions of hectolitres. It is also sent to many of the neighbouring departments, and is even exported to England.

The mode of procuring the native sulphate of lime, is either by forming pits or galleries, as in other quarries. We remark, in quarrying the plaster stone, three principal varieties, the one in crystals, agglomerated into irregular masses; of this great quantities are got, containing about twelve per cent. of carbonate of lime; this is the stone which is commonly employed in making plaster to be used in buildings, and for improving the quality of soils. The second kind, formed of lamellar sulphate of lime, crystallized and nearly pure, is found in tables, bisected at their bases, by oblique angled parallelograms; it is also met with in the forms of prisms and lentils, more or less large, isolated in groups or rosettes, and also in the form of the heads of lances; it is yellow, and as clear as water. It is used for the making of the finest plaster, which is employed for making moulds and casts, and in stucco. The third variety, used in the arts, is found in homogeneous masses, semi-transparent, white, but containing yellow zones: it is capable of acquiring a greater degree of hardness, by a slight baking, and of receiving different tints. This substance, which is known by the name of alabaster, is made into

vases, and various other ornamental objects; but it must not be confounded with the alabaster of the ancients, which was a crystallized carbonate of lime, of a yellow colour, veined, and capable of receiving a high polish.

We also find in nature a kind of anhydrous sulphate of lime, but as it is not capable of becoming solidified with water, so it is not employed. A bluish silicious variety, which is found in Italy, is employed in making chimney pieces, pavements, &c.

It is the crude sulphate of lime, which, disseminated in great abundance in the soil of Paris, and the surrounding heights, communicates to the water in the wells of this city, that selenitic quality, which renders it improper for the purposes of washing and boiling vegetables. We may, indeed, in part, remedy this inconvenience by decomposing the sulphate of lime, with which it is nearly saturated, by the sub-carbonate of soda, which precipitates the lime in the state of a carbonate: it will require nearly 250 grammes of the sub-carbonate of soda for 100 litres of water, admitting that this contains the three hundredth part of its weight of sulphate of lime.

On baking the plaster.—They use for baking the plaster, many sorts of furnaces; but that which is most commonly employed consists of a rectangular building of from eight to ten feet square, and about nine feet in height, formed of three walls, built either of bricks, or rough stones, of from sixteen to eighteen inches in thickness, terminated by a vaulted arch, and covered by a roof, at the distance of two feet.

They construct, across the mouth, or open front of this building, with plaster stone, several parallel rows of vaults, employing for this use the best shaped stones; they then cover these vaults with more plaster stone, first using the larger pieces, then smaller ones, and, finally, covering the whole, near to the vault, with the smallest pieces, and the dust formed in breaking the plaster stone. They then place, underneath the vaults formed in the plaster stone, either some bavins of dry wood, or billets, or faggots, according to the locality. The flames penetrate through the vaults, and the stones which surmount them; but they finally escape through flues made in the wall opposite to the front of the furnace, near the chimney.

Lime kilns, where the calcination may be continued without intermission, without employing wood, but pit coal, may also be used, in various localities, for baking plaster.

Whatever may be the mode of constructing the furnace adapted for this operation, we may remark great variations in the quality of the plaster obtained; in fact, those parts of the stone which are nearest to the fire, in consequence of the temperature being too great, begin to undergo an igneous fusion, which renders the plaster incapable of imbibing water, like the native anhydrous sulphate of lime. Also, in the middle of the same stones, and especially in the centre of those which are the farthest removed from the fire, we always meet with a nucleus, more or less great, of crude, and, consequently, inert plaster. We may readily conceive that a mixture of the parts which are too much calcined, with others that are too little baked,

in different proportions, must yield a product of a greatly variable quality. It, indeed, sometimes happens that the whole quantity in a furnace is either too much or too little baked, and thus furnishes a plaster unfit for use, and which the builders refuse to employ, and with reason. In this case, the purchaser is generally obliged to mix the bad plaster, in various proportions, with that of a better quality.

We may readily conceive that from these causes we most generally obtain plaster of an inferior quality. I have occupied myself in searching for the means of constantly producing plaster of the greatest degree of hardness, and have to remark,

First. It has hitherto been thought that it was the lime, in certain varieties of the plaster, which augmented its hardening quality, when mixed with water. But, in fact, the temperature most fit for calcining it, appears from my experiments, to be much lower than that usually employed in the decomposition of carbonate of lime; and if this latter substance concurs in ameliorating the quality of the plaster, in some of the processes in use, it is probable, that from its interposition, it facilitates the transmission of the heat, and hinders in part the ill effects of calcination at too high a temperature; and it appears that the granular carbonate is harder than plaster, as used in various mortars.

Secondly. In various parts of the ordinary furnaces, the calcination, being unequal, produces great differences in the useful properties of the plaster obtained, and nearly all the kinds produced are defective, either from the excess or defect of the temperature.

Thirdly. In fact, the interior parts of the calcined stones contain crystals, either not altered, or incompletely deprived of their water of crystallization, and are thus deprived of the properties we seek for in this plastic material.

These preliminary remarks lead me to suppose that the degree of temperature fit for the baking of plaster, is considerably less elevated than that generally employed, and indeed I was not long in ascertaining the fact, by the following experiment.

I reduced into coarse powder some of the plaster stone, from Montmartre, and exposed it on the outside of a tube, to the heat of a continued current of high pressure steam, at 105 degrees, as it passed through the tube. At the end of six hours, I ground this powder fine, and knew, upon mixing it with water, that it had acquired the property of solidifying with greater energy than plaster of the same sort, baked in a furnace in the usual manner. Wishing to know the limit of temperature at which the native sulphate of lime in powder lost its water of crystallization, I tried successively the effects of still lower temperatures, and found that at 80 degrees of the centigrade thermometer, the plaster obtained solidified with water, whilst the fragments of impure plaster, in small lumps, were not sufficiently calcined at 95 degrees; and, in fine, that the regular crystals of sulphate of lime, exposed to the same temperature, were only partially desiccated; the effect not penetrating to any great depth.

These facts permit me to hope, that we may now be able to treat

plaster stone, in the large way, with regularity, and thus constantly obtain this plastic material of the best quality. In fact, as the whole question of baking the plaster is now reduced to a simple desiccation, easily effected by steam, so all the difficulties hitherto experienced, from the bad construction of the furnaces, whether heated by wood, pit coal, or turf, may be made to disappear.

We can also thus usefully employ the enormous quantities of plaster stone in powder, which now encumbers the quarries; as it would be proper, henceforth, either to crush the stone into small fragments, or, still better, to grind it to a coarse powder in mills, before baking it. This first labour would not be lost, as the baked plaster might be sifted, and directly employed without being subjected to pounding or beating, an expensive operation, and which always causes the loss of a great quantity of the material.

A perfect regularity in heating the plaster stone may be attained by means of steam; using an inclined plane, formed of cast iron tubes, flattened at top, and communicating with each other at their ends. This steam tube is to be connected with an ordinary high pressure steam boiler, and so disposed that the condensed water may return again into the boiler. A manometer (or steam gauge) must be placed on one of the tubes to indicate the pressure of the steam, and to regulate the temperature accordingly. A pipe with a stop cock must be placed on one of the most elevated parts of the tubes, in order to permit that air to escape which might oppose the constant communication of the steam. We could also employ a set of cast iron plates, which might be covered with plaster stone to be baked upon the steam tubes, and be removed when that operation has been performed, and replaced by others in constant succession.

Whatever has been the mode of baking adopted, we must carefully prevent the plaster from being exposed for a long time to the air, and especially when it is moist, as it would absorb the water again by degrees, and thus become incapable of hardening when we would employ it, and, in fact, will have become an inert powder.

To use this plaster, we have only to add to the powder a sufficient quantity of water, when it will directly assume the consistence of ordinary mortar, and must be mixed up with a trowel.

The fine plaster, mixed with a solution of glue, and having afterwards various hard and coloured substances incorporated with it, forms the basis of one of the processes employed in the making of stucco, to imitate marble. Plaster is also employed in buildings, and in moulding objects of sculpture: it serves to decompose the ammonia, in the manufacture of sal ammoniac, and great use is made of gypsum in agriculture.

P.

[*Tech. Rep.*

On Polishing Metals.

[From the *Dictionnaire Technologique.*]

Before proceeding to polish metals, they commence by preparing the surfaces they would polish; that is to say, it is of importance to

remove all the marks left by the file, the turning tool, the scraper, &c. in order to render the surfaces uniform.

This preparation is effected on those metals which are not very hard, by means of pumice stone, either used in substance or reduced to powder, and water; when in powder, it is applied upon felt, or upon slips of soft wood, covered with buffalo or chamois skin, if the surfaces be flat; or with pieces of soft wood, properly shaped, so as to penetrate into the hollows, and act upon the raised parts.

When the first coarse marks are thus removed, they then proceed to remove those left by the pumice stone. In order to this, they employ finely powdered pumice stone, which they grind up with olive oil, and employ it upon felt, or upon small pieces of soft wood, such as that of the willow or sallow. It is necessary, in these manipulations, to observe an important rule, which is never to proceed from one operation to another, before previously washing the pieces of work well with soap and water, by means of a brush, in order to remove the pumice stone; using water entirely, before employing oil: and likewise never to use those tools for succeeding operations, which had been used in preceding ones; each stage of the operation requiring particular tools, and which should be kept in closed boxes, in order to prevent the powders from being diffused, or scattered about, when not in use. Without taking these precautions, which must be particularly and minutely attended to, we should be liable to make fresh scratches instead of removing them.

After removing the marks left by the coarse pumice stone and water, by means of finely ground pumice stone and oil, we should wash it with soap and water, and dry it well with a white linen cloth: we must then examine it with a lens, or a magnifying glass, to see whether any scratches yet remain; if not, we may proceed to the polishing.

The softer metals are polished in different manners, according to their size and their uses; the larger gold works are, however, generally burnished; but the smaller gold works in jewellery, &c., and those in brass for watch work, are not burnished, but polished. The following are the manipulations. After having removed with oil stone powder, the marks of the file, &c. they smoothen them with blue and gray stones, and plenty of water: there are two kinds of these stones, the one soft, and the other hard; the first is designated by Brongniart, under the name of argillaceous schistus, and is the kind in question: the second kind is named by the above mineralogist, *schiste coticule;* this serves to sharpen tools upon. The pieces of watch work are always smoothed in this manner, until all the marks disappear, and which is known by washing them in the manner above mentioned with soap and water.

They finally proceed to the polishing by employing the tripoli from Venice, which is most to be preferred, and is either finely ground in water, or in olive oil, according to the different cases, for pieces of gold work, or the larger kinds of jewellery articles, and until they perceive their surfaces are become perfectly brilliant: they then

finish them with tripoli, reduced to an impalpable powder, and applied upon a very soft brush.

For polishing those pieces of watch work which are not to be gilt; after smoothing them with the gray or blue stone and water, they polish them with rotten stone, well washed over, and consequently very fine, ground up with olive oil, and finish with dry rotten stone.

This rotten stone is, according to M. Brongniart, a kind of very light tripoli, but finer and more friable than the other sorts. It comes from England, and is highly esteemed for polishing with; it is of an ashy gray tint, and is found in thin layers, upon the compact carbonate of lime, near Bakewell, in Derbyshire.

The polishing of steel is not executed in the same manner as in polishing the softer metals: the steel is not polished until it has been hardened, and the harder it is the more brilliant is its polish.

The substances we have above indicated for polishing other metals are not powerful enough to attack a substance so hard as this. We must employ emery, a substance so well known, as not to need describing here; it is used after having been ground in oil.

The hardened steel is either polished flat, like glass, or cut into facets like a diamond, and, consequently, the lapidary's mill is used.

They commence, by smoothing the work with emery rather coarse, then with finer emery, and finish with the finest. The smoothening being perfectly effected, they polish it with English rouge (tritoxide of iron) and oil, and, finally, finish it with the putty of tin (peroxide of tin) and water; but if upon mills or laps of zinc, then without the use of water. When the steel articles consist of raised and hollow work, they are smoothed and polished with the same substances; but the instruments are, as in the case of the less hard metals, pieces of wood, properly shaped, and employed in the same manner.

L.

[*Ib.*

The Antiquity of the Art of Paper Making.

It has been generally conceived that the first rudiments of the art of making paper, according to the process now in use, were acquired by the Arabians from certain Bukharian manufacturers, about the year 704, and by them introduced into Spain, in the eleventh century. We are, however, about to draw the reader's attention to a work which throws an entirely new light on the subject, and goes far to establish a remoter date. The conjectures of former investigators have been derived exclusively from a consideration of the *materials* employed by the ancients; but our learned friend, Musumeci, in his recent essay "on the ancient use of various kinds of paper, and the art of making it,"* has taken up the subject on the only grounds from which clear and positive inferences can be drawn; he has inquired into the *mechanical means* by which those materials were produced, and instituted a "comparison of the process for

* Catania, 8vo. 1829.

making common papers, as now practised, with that which is recorded by the ancient writers." In doing this, he has also communicated the relative results of his researches.

Musumeci collects from Pliny,* the only one among the ancient authors who treats at any length of the art of making paper, that there were seven distinct kinds of paper known in his time;—the *Hieratical*, or *Sacred*, (afterwards called Augusta,) which was of so delicate a texture, as to be ill adapted to the purpose of the pen;—the *Amphitheatrical*, so called from the spot where it was manufactured, which was originally of very coarse quality, and fit only for common use;—the *Fannianal*, which was the same as the latter, but was ameliorated in quality by Fannio, from whom it derives its name;—the *Saitical*, first made in Sai, a town in Egypt, and composed of the vilest refuse, such as woollen rags, and the like;—the *Tenionical*, a coarse paper, resembling the bark of trees, valued more for its weight than its goodness;—the *Emporetical*, or *Emporical*, which was unfit for writing, but much used in trade;—and, lastly, the *Papyrus*.

We collect from the same authority, that all these kinds of paper corresponded, in a greater or less degree, with those of modern times; and that the present method of making them does not differ from the ancient. It is evident, therefore, that former inquirers, having erroneously considered ancient paper to be identical with papyrus, have been seduced into equivocal and ill founded conjectures as to its nature. Now what does Pliny report? "Every sheet of paper is made from materials in a damp state, composed of a substance derived from the fibres of vegetables; both sides being dried on a low table or superficies, of whatever length it is desired the form or frame of the paper should possess; the lattice (or wire) work is afterwards turned, and the sheet is complete." If it be added, that "the sheets are laid in a press, dried in the sun, placed together carefully with the most minute respect to quality, and sorted into bundles or quires," all which operations are recited by Pliny, we can arrive at no other conclusion than what Musumeci has insisted upon, namely, that the process followed by the ancients is precisely analogous with that which is pursued at the present day. It appears, on further investigation, that the frames which the ancients used for their paper were not dissimilar to our own; that they were made of brass; and that the process of sizing was much the same; the dimensions as numerous; the uses as similar; and the defects as striking, as occurs with our own papers. It is quite obvious from these facts, which rest equally upon Pliny's testimony, that paper itself, though styled "papyrus," was not a composition made with the small pellicles of the plant which bears that name, and glued together by the muddy waters of the Nile, as former interpreters have affirmed, but that it was manufactured under a process of maceration, whereby the pellicles were reduced to a pap; the only means capable of imparting to

* Nat. Hist. lib. 10. cap. xi. xii. et xiii.

it that substance, whiteness, delicacy, &c. which Pliny so clearly indicates.

An indisputable proof of this fact exists in the papyri, lately described by Champollion, which cannot possibly have been formed by mere contexture, but must have been the result of maceration, and a fusion of the parts into one another. The same remark applies to the sort called *Saitical*, which Pliny states to have been made from rags and the vilest refuse. The process appears to have been known in times posterior to those of the Roman naturalist; for Cassiodorus, who lived at the emperor Theodoric's court at Ravenna, when recommending paper making to the assiduous attention of his contemporaries, makes special mention of maceration, but never of contexture. It should also be recollected, that, in Cassiodorus's time, five centuries later than Pliny's, Ravenna was celebrated for the manufacture of paper, which was composed of the *scirpus ravennatus*—in all probability, nothing more nor less than the common rush of our own rivers. Ginnani is of opinion, that this was the paper which constitutes the greater part, if not the whole, of the papyri now extant in the principal libraries of Europe: a circumstance which serves to strengthen the opinion many have entertained, that the papyri of Herculaneum were made of a pap, derived from the refuse of old leather, and capable, as results from repeated experiment, of resisting the effects of fire and water. [*Athenæum.*

On the dark precipitate of Platina of Ed. Davy, and on the property of spongy Platina. By M. Liebig.

The black precipitate of Davy is obtained by heating the sulphate of the oxide of platina with alcohol. This substance, when dried, emits an ethereal odour, and possesses the remarkable property of becoming red hot when moistened with spirit of wine, and continuing so as long as the alcohol remains. Acetic acid is formed during the ignition.

M. Doebereiner ascertained that this substance absorbs all the combustible gases, but does not absorb either oxygen or carbonic acid. Saturated with hydrogen and placed in contact with oxygen, it effects their combination, and becomes incandescent. Presuming that finely divided platina might possess the same property, he tried it, and thus discovered the remarkable inflammation of hydrogen by spongy platina.

The best mode (according to the author) of obtaining the black precipitate, is to procure the *chloruret* (chlorure) of platina, by heating strongly, and for a long time, the *chloride* of the same metal, and to treat this chloruret, which has a greenish yellow colour, with a concentrated solution of potash. It forms with heat a perfect solution, dark and thick, into which alcohol is to be poured by slow degrees, shaking it well. In a short time it effervesces strongly, discharges much carbonic acid, and a very heavy velvet black powder subsides, which must be boiled successively with a little alcohol, hy-

drochloric acid and potash, and lastly four or five times with water, and then washed and dried in a porcelain capsule, without coming in contact with a filter or any organic substance.

This dark powder is granular and hard, and loses no weight by being strongly calcined in the air. It dissolves in aqua regia, and gives a limpid solution, which contains only chloride of platina. Moistened with spirits of wine, it quickly ignites, and produces acetic acid; placed in a receiver filled with oxygen, over mercury, and moistened with alcohol, the mercury soon rises, acetic acid is formed without the least trace of carbonic, and in a week or a fortnight the oxygen is completely absorbed.

In the air, it instantly inflames hydrogen. Its specific gravity is about 16. It is therefore nothing more or less than metallic platina extremely divided, acting like spongy platina, only in a more intense degree.

Metallic platina precipitated by zinc, from its acid solution possesses the same properties.

The platina black (to avoid periphrasis) possesses in the highest degree the property of absorbing and retaining a multitude of gases.

If it is not boiled well in water, or if, before drying it, it is moistened with spirits of wine, the latter cannot be expelled entirely even under the air pump. If, in this condition, it is heated to the temperature of boiling water, it begins to ignite, and burns the paper on which it is placed. Even though entirely deprived of alcohol, and after being dried in an exhausted receiver aided by the presence of sulphuric acid, if brought suddenly into contact with air, it becomes occasionally so heated by the absorption as to ignite and burn the paper.

The solution of chloruret of platina in potash, being mingled with a notable quantity of nitrate of copper, forms by boiling in spirits of wine, a precipitate, which, though it contains at least twice as much oxide of copper as platina, retains the property of igniting with alcohol.

According to Mr. Doebereiner, one hundred grains of platina black absorb twenty cubic inches of hydrogen gas. This reduced to comparative volumes gives one to seven hundred and forty-five, which sufficiently accounts for the great elevation of temperature and ignition with hydrogen or alcohol.

Even iron possesses an analogous property. If obtained by the reduction of its oxides by means of hydrogen, it is in such a state of extreme division as to combine with oxygen, so rapidly as to inflame at the common temperature.

Both the black and the spongy platina lose the property of inflaming by continued use, owing to their becoming more dense or less porous, or from having their pores obstructed by foreign matter; or from the air which they contain losing its oxygen. The method of restoring the property is to boil it in nitric acid, which has no other object than to expel and replace this air. Boiling the sponge in water answers the same purpose.

The absorbing power of finely divided platina appears to be analo-

gous to that of some other substances, except that it acts so much more powerfully on inflammable gases. Charcoal absorbs very little hydrogen, not so much even as dry wood. The effect in each case doubtless depends in a great measure on the relative dimensions or figure of the molecules of the gas and of the imbibing substance. Hydrogen contained over mercury in a receiver, which has a crack in its upper part, will gradually escape and the mercury will rise, in opposition to its gravity. No other gas possesses this property.

It would appear reasonable to ascribe the ignition of the spongy platina in part to the extermination of latent heat, arising from the affinity of oxygen and hydrogen, or in other words, to electrical action. But charcoal absorbs both ammoniacal and muriatic acid gases in equal proportions, when the electrical states are directly opposite. Affinity therefore cannot be the cause of the absorption, nor is it more probable that it is so in the case of platina and hydrogen.* [*Annales de Chimie.*

FRANKLIN INSTITUTE.

Report of the Committee of Premiums and Exhibitions.

To the Board of Managers of the Franklin Institute, for the Promotion of the Mechanic Arts, the Committee of Premiums and Exhibitions respectfully report:

That in pursuance of the arrangements previously made, their 6th exhibition of domestic manufactures was held at the Masonic Hall, on the 14th of September, and continued open for five successive days, during which it was most extensively visited, both by the members of the Institute and by the public at large. It is conjectured that not less than 20,000 persons visited the exhibition, all of whom experienced, we believe, the highest satisfaction at the great improvement it manifested. It was not so much by the number or quantity of the articles deposited, as by their great excellence, and by the visible amelioration in their quality that this exhibition distinguished itself from all preceding ones. We do not propose to notice here (indeed it would be impossible to do so satisfactorily) all the various objects presented; as many were brought in after the exhibition had commenced, and could not be regularly recorded in the catalogue. We will first report on those articles that claimed a premium.

Of the 37 premiums proposed by the Institute, three only are adjudged to be due.

The first is "for the best stock or standing vice, equal to those called Tower Vices, and weighing thirty pounds or upwards, not less than three to be exhibited," which the committee consider to be

* Has the experiment been tried of causing dry powdered fresh charcoal to absorb a portion of ammonial gas, and then to place it over mercury in a receiver filled with muriatic acid gas? would ignition ensue?

fully deserved by Archibald Lamont, of Pittsburg, (Pennsylvania,) for the vices presented by him. In execution they are reported by competent judges to be quite equal to any imported; in design, they offer a variation from those in general use, the screw of the box being cut out of the solid, while in the English vices, the thread of the box is brazed in. This will present the advantage of greater durability. The temper of the vices was tried and ascertained to be very good.

The 2nd premium was awarded to Jacob F. Walter, of this city, for a cooking stove, invented by him, and which has been ascertained to perform well, the various operations of cooking, with anthracite coal; the cost of the stove being only thirteen dollars. The object of the Board in offering this premium, and in limiting the price at fifteen dollars, is understood to have been to encourage the extension of the use of anthracite in families whose restricted means have hitherto disabled them from purchasing expensive stoves or grates. The simplicity and cheapness of Mr. Walter's stove, will, in a great measure, effect this; but the committee deem it their duty to state, that it is, in their opinion, liable to a serious objection, which is, that the objects intended to be cooked are exposed to the gases resulting from the combustion of the coal. This, which is said to produce no injurious effects under ordinary cases, might become highly objectionable if a more impure kind of coal than that now found in our market were brought from the mines. It is not difficult to foresee that instances might arise in which these gases would assume very unpleasant, and perhaps even very dangerous properties. As, however, Mr. Walter's stove meets the conditions proposed by the Institute, the committee have not felt themselves at liberty to recommend to the Board to withhold it; but they would suggest that a premium be offered for the same object next year, with an express condition that the furnace of the coal shall not come into contact with the victuals exposed for cooking. The price might also be reduced to a lower limit. Mr. Walter will, of course, be expected, before he receives the medal, to give the usual assurance to furnish any required number at the same price, and of equal quality.

The Institute had offered premiums to the maker of a vegetable oil that would answer as a substitute for olive oil, or for spermaceti oil; whether by this they intended that it should answer all the purposes of olive oil, or merely some of them, does not clearly appear; but being desirous to give it the most liberal construction, the committee recommend the awarding of a silver medal to Charles A. Barnitz, of York, Pennsylvania, for the sunflower oil exhibited by him; it is not fit for the uses of the table, unless by persons who prefer a very sapid oil, but it may be employed with advantage in painting, as it is highly siccative, and is applicable in many other cases as a substitute for olive oil; they therefore coincide with the judges on chemicals in considering it as a valuable accession to our stock of native productions. They understand that it is already manufactured and consumed in various arts to a great extent.

Of the other premiums proposed, the committee conceive that

none are strictly due. This is, however, not unexpected, as many of those related to manufactures known not to be as yet established in this country, but to which the Board thought proper thus to invite the attention of the public. The committee, following the precedent set to them on former occasions, have, however, agreed to recommend to you to award premiums to the following persons.

1. To Messrs. D. and J. Henderson, of Jersey city, for the Flint Stoneware exhibited by them, a SILVER MEDAL. Competent judges have reported to your committee that "it is equal in quality to any ware of the same kind known to them, and superior to any made in this country. It is a strong and handsome ware." As it is comparatively cheap, and an article likely to be extensively used in families, the committee think this manufactory deserves special encouragement.

2. It has been represented to us that the manufacture of Leno established in this city, by Joseph Ripka, was one entitled to notice on account of the great perfection and cheapness of the articles made by him; and the committee having observed with great pleasure his indefatigable exertions to promote American manufactures by the introduction of new fabrics, have agreed to recommend to the Board to reward him with a SILVER MEDAL.

3. Of all the articles exhibited this year, none, we think, attracted more notice, or excited more interest, than those of silk. The various publications which have been made on this subject for several years, and in which our fellow citizens have taken a prominent part, had awakened the public to the importance of this manufacture. The committee have received some very able observations on the subject of silk goods, from one of the judges of this article, and as they propose to recommend the publication of a portion of them in the Journal of the Institute, they deem it unnecessary to enter more largely upon it here. They will confine themselves to the observation, that they are unanimously of opinion that a SILVER MEDAL should be awarded to Mr. John D'Homergue, of this city, for his interesting display of American silk in all its conditions, from the cocoon to the most perfect manufacture. Your committee do not wish to be considered as embarking in the questions which have agitated the public mind on the subject of silk; these they believe to be foreign to the objects of their appointment, but think they may without trespassing upon forbidden ground, bear their evidence to the intimate acquaintance with the subject manifested by Mr. D'Homergue, and evinced in the various specimens manufactured with his own hands. Had there been the requisite quantity of sewing silk, no doubt can be entertained that he would have been entitled, *of right*, to the premium.

Of the extent which the manufacture of silk is likely soon to acquire, the committee received some information from a letter communicated to them, stating that one individual in Connecticut, had received last season at least eighty thousand skeins of sewing silk, manufactured in that state.

4. The committee deem this a fair opportunity of calling the at-

tention of the Board to a machine "for cutting veneers in one continuous sheet," lately invented by Caleb B. Burnap, of Belfast, Waldo county, Maine, patented May 1, 1829, (Journal of the Franklin Institute, vol. iv. p. 120.) It has been described to them by competent judges to be a great improvement in the art of sawing veneers, as it shows the whole figure of the wood, which could not be produced in any other way; the machine is simple, and as it has been more than a year in operation, without its novelty being contested, (as far as your committee are advised,) they deem it proper to recommend the awarding of a SILVER MEDAL to the inventor. There were, at the exhibition, several pieces of ash and maple veneers obtained by this machinery, and the furniture manufactured with them was very fine.

5. Believing that the manufacture of cabinet ware and house furniture is one in which our city is deeply interested, from the high reputation of its mechanics, and the extensive commerce which it carries on in this branch of industry, the committee had observed with regret that there seemed to prevail too little anxiety to innovate in the designs, and that while the workmanship continued to improve from day to day, the forms remained unaltered. A slight deviation, and it is generally believed a real improvement in the mode of attaching the looking glasses of toilets, was manifested in a very beautiful specimen of maple work, exhibited by Mr. John Jameson, of this city, and with a view to evince their anxiety to promote such innovations, the committee have agreed to recommend that a SILVER MEDAL be presented to him. They understand that this piece of furniture was the exclusive work of Walter Pennery, a youth apprenticed to Mr. Jameson. As the execution of the work reflects great credit upon him, he fully deserves an honorary mention.

6. It having been represented to us by competent judges, that a piano forte made by F. W. Pommer, jr. (a lad of fifteen years of age) exhibited great ingenuity and precocity of skill, and the judges having "desired that such early evidence of talent and perseverance should be rewarded by some mark of approbation," the committee have (after ascertaining that the instrument was wholly and exclusively the manufacture of this youth,) agreed to recommend that a SILVER MEDAL be awarded to him for it. The committee desire it to be distinctly understood, that it is not for the excellence of the instrument, or the beauty of its workmanship, which they wish to give a reward, but for the talent manifested by the young artist.

7. They also think that a SILVER MEDAL is due to John Yard and Co. of Morrisville, (Pennsylvania,) for the splendid display of mother of pearl work, manufactured and exhibited by them. This is almost a new branch in this country, and the perfection which it displays entitles it to a favourable comparison with the best specimens of foreign workmanship.

8. The committee observed with pleasure the great notice taken by the public of the splendid lamps, chandeliers, &c. exhibited by Christian Cornelius, of this city. The magnificent one made by him for one of our churches, is a proof that for beauty of design and ex-

cellence of execution in this manufacture, we need not look abroad for superiority over our own mechanics; we therefore recommend that a SILVER MEDAL be awarded to him.

The committee have not thought it adviseable to extend further the list of premiums, and while they deem it impossible for them to do justice to all those that contributed to the objects of the Institute, by depositing specimens of their work, they trust they may be indulged in a few observations on some of the prominent articles exhibited.

They observed with peculiar interest the Margaric Acid manufactured by Messrs. Seybert and Vanuxum. The history of this substance is interesting. It appears that these scientific manufacturers attempted its preparation by the method recommended by the French discoverers, but found themselves foiled in the attempt; the process being incorrectly given, probably with a view to mislead such as would undertake to repeat it. This induced them to institute a course of experiments on fatty substances, the result of which has been the discovery of a new and original process, which, judging from the specimen exhibited, produces an article of even superior quality to the French. Had it been manufactured on a sufficient scale to warrant its being thrown into commerce, your committee would not have hesitated in recommending it for a premium; but at present, they confine themselves to the expression of their hopes that before the next exhibition it may become an article supplied in sufficient quantity to entitle it to rank among the manufactures of this country.

Among the chemicals, there were specimens of sugar of lead, of the manufactory of Messrs. Wetherill, and of Mr. John Harrison, of this city, both deserving of honorary mention. They also noticed the chromic yellow and white lead of the Messrs. Wetherill, the bi-chromate of lead of Mr. Badams, of New York, the samples of West's superior rouge; Mr. Cashing's fine Cologne water, and the black lead crucibles of the Ixion works of Barton, which they understand have been extensively and successfully used.

The marble mantel pieces of domestic and foreign materials, exhibited by Messrs. John Struthers, Peter Fritz, Frederick Fritz, and Isaac B. Garrigues, maintained the high reputation of their makers.

The exhibition of piano fortes was unusually interesting; they were made by Messrs. Loud and Brothers, Charles Pomer, C. F. L. Albrecht, C. Myers, and J. J. Mickley, of this city. From the first of these skilful artists they noticed a three stringed piano, remarkable for its force and equality of tone, and the one chord piano by the same maker, merited attention for its power and simplicity, while it appeared to the judges "to be particularly calculated for the country, where the difficulty of keeping instruments in tune is severely felt."

The cabinet ware made a very fine show, and the committee are indebted for it to the zeal of Messrs. John Jameson, Joseph Akens, A. G. Querville, J. A. Stewart, Wm. Christie, and Wm. Browne, of this city, and to Mr. Prince, of Salina, New York, from whom

they received a very handsome writing desk and work table. When it is recollected that these articles were, for the most part, not made expressly for exhibition, but that they were taken indiscriminately from their extensive warehouses, they from this circumstance acquire additional interest.

The same observation applies to the coal grates and stoves, which displayed great improvement in elegance of form, and in the excellence of their workmanship, and also a more intimate acquaintance with the principles of science, which should never be disregarded in this manufacture. They were from the stores of Messrs. S. P. Morris, Jonas Gleason, Dennis Murphy, George Godfrey, Thomas Rodgers, jr. and N. Lloyd and Son. The judges also visited and made report on two grates applied to culinary purposes, invented by Charles Savage and by Jacob F. Walter; both of them were in operation, and gave great satisfaction to those persons that had used them; that by Mr. Savage was not liable to the objection noticed in Mr. Walter's cheap stove, to which the premium was assigned. A very fine fender, made by Thomas Barnhurst, was deserving of particular notice.

A good display of porcelain, consisting of upwards of one hundred and fifty pieces, manufactured by Mr. William E. Tucker, exhibited considerable variety of forms, designs, and styles, and elicited much admiration. It was gratifying to observe, that the premiums awarded to this enterprising manufacturer, on former occasions, have stimulated him to further exertions. Much improvement was apparent, especially in the painting and other ornamental parts, and the committee remark that the forms are generally chaste, and copied from the best models. They cannot omit also paying a merited compliment to Messrs. Smith, Fife & Co. of this city, for two beautiful porcelain pitchers, exhibited by them, and the committee had only to regret that their display was not more extensive.

The artificial teeth manufactured by Messrs. Van Pelt and M'Ilhenney, are worthy of notice, as possessing most of the qualities that are desired in such articles. The enamel is even, strong, of good colour, and bright; and they are exempt from the principal fault in teeth of this description, namely, roughness, which occasions so unpleasant a sensation when such artificial teeth rub against the natural.

The committee note with pleasure a good collection of fire bricks, slabs, muffles, cupels, &c. from the justly celebrated manufactory of Mr. Berry, of Baltimore.

In woollens, our display was much more limited than on former occasions. Our manufacturers are, we believe, turning their attention chiefly to cloths of a moderate price, which they are unwilling to send to an exhibition where they apprehend that they may be brought into comparison with higher priced goods. We have to regret that the views of the Institute still seem to be misunderstood on this subject. Goods of all qualities with the prices annexed will always be cheerfully received and judged accordingly. The Institute is aware that in a country like ours, the demand for high priced articles must always be limited, and that the intelligent

manufacturer will generally look to a coarser article for a more safe and a more extensive market.

In cotton goods the display was fine and interesting, but the committee pass over it rapidly, as they propose recommending to the Board to publish a large extract from the able report made by the judges on this article.

In addition to the silk manufactures of Mr. D'Homergue, the committee received fine specimens of sewing silk from Mr. Bulkley, of Hampton, Connecticut, also some prepared by a number of young ladies in Connecticut, and by Miss Brush, of Bedford, New York. The latter was obtained on the Italian reel, under the direction of the Pennsylvania Silk Society, and was declared by competent judges who tried it in tayloring, mantua making, and hat manufactories, to be equal in all respects to the imported silk.

In mechanics, we observed various machines, such as clocks, models of rail-road cars, or wagons; of canal boats; of agricultural implements, &c. all of which were referred to the committee on inventions, from whom a report may be expected on such as deserve special notice. These articles attracted considerable attention, and in this respect the exhibition will be useful in extending the names of the artists. We record here a curious pipe for mineral water, which is formed of tin coated with lead, manufactured by the Messrs. Wetherill, and which may prove valuable in the arts.

The committee think it also proper to notice the very fine carpets exhibited from the manufactures of John M'Fee and John Scott, and three fine rugs made by Lermont, Tannahill, & Co. of Germantown; also the Brussels rugs made by La Chapelle.

There were also some cast iron vices, made by Mr. M'Cord, of Washington county, New York, which attracted the attention of the committee, chiefly on account of the arrangement of the ball and socket washer, an arrangement which appeared to them new, and which may offer some advantages, but upon which they would not express any decided opinion, believing that experience will furnish the best test of its value. The planes by Kennedy & Co. of Hartford, Connecticut, by Emanuel W. Carpenter, of Lancaster, Pennsylvania, and by Jacob White, of this city, were deserving of great praise.

The patent screw auger, by George Shettee, of York, Pennsylvania, is thought deserving of notice.

The cutlery of Messrs. Morse & Co. of Worcester, Massachusetts, and the wood screws of Mr. L. Gougon, of Philadelphia, are very fine articles, which will command a ready sale if the maker can afford to dispose of them at the prices charged for similar articles of foreign manufacture.

They also advert with great pleasure to the fine edge tools manufactured by Dunlop, Madeira, & Co. of Chambersburg, Pennsylvania.

A great display of japanned waiters and other work, by Messrs. Nash, Ogle, Mustin, and Blackmore, indicate constant improvement. The different branches of hardware are evidently those which have made most progress, and were we not afraid of trespassing too much

we would with pleasure make large extracts from the able and minute report of the judges on these wares.

Some very good blister steel was exhibited, but none superior to what obtained a reward at former exhibitions. Very handsome iron, rolled by Reeves and Whittaker, was deposited by them.

The very splendid display of glass contributed as usual to enhance the beauty of the exhibition. The cutting by Daniel Linan, by M'Cord and Shiner, and by Scrimger and Dockety, bore ample evidence of the skill of these able artists. It was tasty, regular, and well executed. The glass was clear, white, and free from defects.

The Institute have on former occasions manifested the deep interest they take in the introduction of the manufacture of straw bonnets in this country; the perfection exhibited in the specimens presented on former occasions, seemed to leave nothing to desire, but those presented this year, far surpassed all others. They received an universal share of attention from the fair visiters of the exhibition, and the judges have reported to us that the split straw bonnets made by Mrs. Henly, of this city, from plat made in Boston, excelled any thing of the kind they had ever seen. We are precluded from recommending them for premium, by the knowledge we have that at the time of the formation of the list of premiums for 1830, the managers were unanimously of opinion "that a due regard to the other branches of industry, and to the funds of the Institute, would not justify further premiums on this branch of industry, while they regretted that all their efforts had been unavailing to call the attention of Pennsylvania to its importance."

We must not omit to mention the splendid display of silverplate from the workshops of Messrs. Thomas Fletcher, Edward Lownes, and R. and W. Wilson. In combs, brushes, books, stationary, specimens of the fine arts, of book binding, fancy articles, leather work, &c. &c. &c. there was the usual variety and excellence, but our limits do not permit us to particularize them.

At the conclusion of the exhibition, the committee thought it expedient to hold a public auction of such goods as were intended for sale. In doing this, they yielded to the wishes of many of the depositors. The sale was much more successful than that attempted on a former occasion; but it was not sufficiently so to justify, in our opinion, a perseverance in this plan. There seems to be a difficulty in bringing purchasers from the usual auction stores to a place out of the ordinary precincts of business; a distrust exists that the goods are valued much above their ordinary market price, and that they are not offered without reservation. These considerations affect unfavourably both the purchaser and the seller, and when we advert to the great trouble and risk that attend such a sale, your committee cannot recommend its being again attempted.

It may not be amiss to state here, that all the goods deposited were restored to their owners without any material injury or loss; a fact highly creditable to the population of our city.

The committee think it proper to make one or two observations upon the general character of the goods exhibited, which they trust

may not be unprofitable to our manufacturers. Experience has shown that those goods are the most popular, and are held to be in best taste, which are the plainest and the neatest. It is more by the elegance of their forms, by the chasteness and appropriateness of their ornaments, and by the simplicity and uniformity of their colours, that taste is displayed and admiration secured. As to those works in which gaudiness takes the place of neatness, in which all the colours of the rainbow are brought together, and of which uncouth carvings, heavy mouldings, and overloaded gildings, are the chief recommendations, although they may please an immature and an unimproved taste, they cannot, and experience shows that they do not, find favour with a discerning public. This observation applies to cabinet ware; to pianos; to porcelain; to glass ware; to marble mantel pieces; to all kinds of architectural works; to coal grates, &c. and as far as colours are concerned, to printed cotton and silk goods, &c. &c. We take pleasure in stating that the manufactures of this country are daily becoming less liable to censure on this score. Another point in which we observe great improvement, since the first exhibitions of the Institute, is in the general finish of the articles; formerly, while those parts which were intended to be prominent were overloaded with meretricious ornaments, coarsely finished and unskilfully applied, the rest were left in the rudest condition; now the whole of it approaches more to that finished style of elegance which so peculiarly distinguishes the productions of England. To this point we would chiefly invite the attention of our manufacturers; although much has been attained, still something remains to be done.

Finally, the committee beg leave to recommend to the Board the adoption of the following resolutions, the justice of which they deem too apparent to require any comment.

Resolved, that the thanks of the Institute be presented to the manufacturers and mechanics of the United States, who have contributed to the success of the exhibition, by depositing specimens of their industry and skill.

Resolved, that the thanks of the Institute be most specially presented to the gentlemen of the committee of arrangements of the exhibition, and to the committees of judges, for the friendly and liberal zeal with which they co-operated in the objects of the Institute.

Resolved, that the thanks of the Institute be offered to Messrs. Jennings, Thomas, Gill & Co. for their liberality in assigning over to it the amount of their commissions on the sales at auction on the 20th ult.

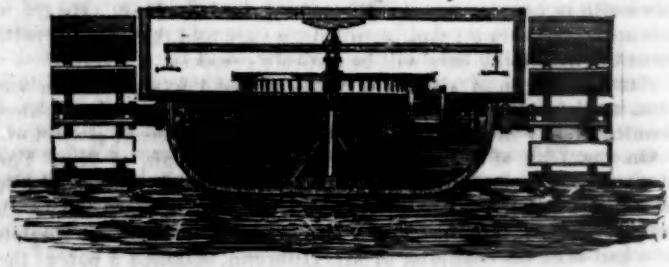
Modern Antiques, No. 4. *By the Editor.*

Horse Boats.

Those persons who are familiar with the progress of mechanical inventions, know that the paddle wheel, constructed like those ordinarily used in steam boats, has been repeatedly applied for the

propelling of vessels. The common impression, however, is, that the horse boat used at many of our ferries, is a modern invention, suggested by the employment of steam boats, and consequently brought into use at a later period than they. The subjoined cut represents a transverse section of a boat invented by M. Le Compte de Saxe, and described in the 6th volume of the *Machines Approuvées*, under the date of 1732. There are three different views accompanying the description, two of which are section, and the other a perspective view of the boat under way, with the horses at work, and the whole bearing a strong likeness to some of our modern acquaintances.

This boat, we are told, will not merely go against the current itself, but may be employed to tow other boats after it. The original drawing has letters of reference, and a corresponding description, but these we have not thought it necessary to give, as most of our readers are familiar with similar machines, *of modern invention.*



Revolving Oars.

An invention still more ancient is described in the first volume of the same work, and bears date in 1699. Two plans of propelling by revolving oars, are given by M. Du Quet. The first we shall not notice, but the second so nearly resembles a contrivance which has been once patented in England, and twice in this country, within the last two years, as to give to it a strong claim to a place in the list of *piracies by the ancients.*

Fig. 1.

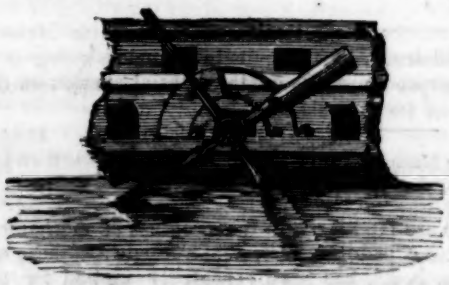


Fig. 2.

a

Fig. 1, shows a part of a side of a vessel, through which projects an axis carrying the revolving oars. The oars revolve with the axis in the manner of paddle wheels, and they also revolve on their own axes, so as to pass into and leave the water edgewise, whilst they act upon it, when immersed, by their flat sides. The manner in which this is effected, is shown in Fig. 2, where one pair of oars, and the apparatus for turning them, are represented.

The two oars, *a*, *a*, have their flat sides at right angles with each other, and are united together and turn in the axis, *b*. Near the middle of each oar is fixed a pin, *c* and *d*, which stands perpendicularly to their surfaces. These pins project equally on either side. Two semicircles, *e*, *f*, *g*, and *h*, *i*, *k*, are attached to the side of the vessel, as shown at Fig. 1. The part, *f*, *g*, *h*, *i*, is solid, whilst the part *i*, *f*, *e*, *k*, is an open space, between the segments *f*, *e*, *i*, *k*, allowing the pins *c* and *d* to pass round when standing in the position of *c*; but when these touch against the side, *i*, *f*, the oar is necessarily made to turn, so as to produce the intended effect. By this revolving of the oars on their own axis, we are told that the difficulties attending revolving oars will be entirely removed.

After the lapse of about one hundred and thirty years, the same idea, and almost the same plan for carrying it into effect entered simultaneously into the heads of two or three different projectors.

On the 16th of March, 1829, Adolph Hilbronn, of New York, obtained a patent for an improved wheel with revolving paddles, which may be seen described in vol. iv. p. 194, accompanied with a copper-plate. A little time previously, a gentleman in England, who had been the coadjutor of Mr. Hilbronn, obtained a patent there for the same thing; and on the 11th of June, in the same year, Mr. Benjamin Howard, of Worcester, Massachusetts, patented a wheel of the same kind.

When we say that these are all essentially alike, we mean that they are so in the leading idea and object of their construction, whilst in their details the difference may be considerable. When inventions interfere with each other, their authors seize upon the most trifling matters of detail, or arrangement, as things of great importance; this, however, is not the view which we take of the subject, as we think that the difference between invention and mere arrangement is very great, although it is commonly overlooked.

Pittsburgh Mechanics' Institute.

In this flourishing city a Mechanics' Institute has been recently organized, with a list of 180 members.

Robert Bruce has been appointed president, and Mr. Thomas Bakewell secretary. A copy of their constitution has been forwarded to the Franklin Institute, and the foundation laid of that friendly intercourse, the establishment of which is most desirable among all similar societies.

It is expected that a course of lectures on chemistry will be delivered during the ensuing winter, and measures will be taken to add

to this a course of practical mechanics, as soon as the necessary apparatus, and a competent lecturer can be obtained.

The constitution declares the object of the association to be "the promotion of the useful arts and sciences. The improvement of its members in practical knowledge, and the advancement of popular education," and that "to effect the objects of this association, it shall, for the benefit of its members, hold meetings for reading and conversation illustrative of the useful arts and sciences; but no debate upon religious or political subjects shall ever be admitted."

"It shall procure collections of suitable books, and apparatus, and of models, or other specimens of the works of nature or art, and shall have power, when the resources of the society render it admissible, to establish a school upon the most approved system of instruction."

It need not be said that they have the ardent good wishes of the Franklin Institute for their most perfect success, and that whatever it can contribute towards an end so desirable, will be cheerfully accorded.

Plan of Mr. LEMUEL BLAKE'S *improved Case and Types.*

IN vol. v. p. 293, we gave an account of an improvement in the casting and setting of types for printing, patented by Wm. R. Collyer, of Boston, February 9th, 1830; and at page 368, an account of a patent nearly identical with the former, granted to Mr. Lemuel Blake, of the same city, and dated March 12th. To these articles our readers are referred for the particulars respecting them.

We know nothing of the question who is "the true and original inventor," nor are we interested in it; but as it is averred that there will be a saving of about twenty per cent. in the composition, and a lessened liability to typographical errors, the proposed improvement merits the attention of those who are concerned in printing, and are capable of forming a correct estimate of its value. We have, therefore, placed the plan of the case, with the note appended, as furnished by Mr. Blake, for that purpose.

Mr. Blake states that he originated this plan upwards of four years since, during which time he has investigated it with great care, and consulted with the most eminent printers, so as to give to it that form which should be the best in practice. The priority of his claim, he says, can be well established.

A similar plan was introduced in England by Earl Stanhope, but the arrangement of his combined letters in the case was inconvenient, and was found, therefore, to result in a loss instead of a gain of time; it was, of course, abandoned.

The united letters introduced by Earl Stanhope, have been placed in Mr. Blake's case, but are omitted in his specification, as he could not lay claim to them.

"The original plan was more extensive, embracing words and syllables of three letters, but after a long investigation, the inventor is satisfied that the above plan, by which twenty-seven new types

are introduced into the case, is carried precisely to the point of utility, without enlarging the present cases."

The Boston type and stereotype foundry have a fount of brevier, with the improved types, ready for sale, with the cases.

Plan of Mr. Blake's improved Case and Types, for which he has obtained a patent.

Spaces.	Spaces.	j	k	er	ed	if	in	so	ff	fi	ffi	,
&	be						is	ss			n Quadrats.	m Quadrats.
qu	by	b	c	d	e	i	it	s	f	g		Hair Spaces.
ll	l			he			of	or			we	..
z	me	m	n	no	h	o	on	y	p	w	;	Quadrats.
x	up			th	Spaces.		at	as			.	
v	us	u	t	to		a	an	re	r	,	-	

Great care has been taken to introduce the new types into the cases in such a manner as not to alter the arrangement of the letters in the old cases, but to place the new types beside or around the initial letters, so that the compositor must go to the usual box for the first letter, along side of which he will find the united letters.

Notice of a Large Magnet.

TO THE EDITOR OF THE JOURNAL OF THE FRANKLIN INSTITUTE.

THE following is a short notice of the large magnet which is now the property of the Philadelphia Museum, and is deposited in their collection of philosophical instruments.

It was made in the summer of 1825, by myself, and its power tried in the presence of R. M. Patterson, M. D. now professor of natural philosophy, and chairman of the University of Virginia. It consists of fifteen bars, of what is called the "horse shoe" form, put together and secured by screws, in the usual manner. The bars measure around the outside 43 inches, and are made of the best shear steel. The "keeper," which is of soft iron, and the ends of the bars are accurately ground, so as to ensure a perfect contact in every part.

The whole instrument, keeper and rings complete, weighs 53 pounds. The bars were "touched" by a nice bar magnet, the property of Mr. Isaiah Lukens, according to his newly discovered method, in the comparatively short space of 30 minutes, and can at any period be restored to their maximum in the same time. A passing tribute of respectful notice is due to this gentleman, for his manner of making and "touching" magnets. He has most ingeniously reduced to a system, the art of giving to them their attractive power, performing in a few seconds, and with infinitely increased strength, that which, in the hands of the makers of mathematical and philosophical instruments, was, and still continues, a mysterious and secret business, involving much time and labour. This magnet on its first trial, required a force equal to 310 pounds to separate the "keeper" from the bars; this may justly be considered the maximum power of the instrument. After the removal of the "keeper," its force remained permanently 134 pounds, which is as justly considered its permanent maximum.

We have in this instance a much greater increase of power in comparison to weight, than has hitherto been considered possible in the formation of magnets of a large size: there is nothing on record (as far as our knowledge goes) that will compare with it, and our notice is given for the purpose (in a measure) of eliciting facts of a similar character.

Yours, respectfully,

FRANKLIN PEALE.

Philadelphia, October 18th, 1830.

Account of the experiments of Mr. J. TYTLER, *on the preparation of Oleocere, or a wax for Candles, from Castor Oil.*

NINE years ago the following passage, from *Brande's Manual of Chemistry*, suggested to Mr. Tytler a course of experiment on the product forming the subject of his paper, viz. "nitric acid, heated in

small quantity with any of the fatty substances, renders them harder, and considerably increases their solubility in alcohol. Among the vegetable oils, this change is most remarkably produced upon cocoa-nut and castor oils; the latter becoming converted into a solid matter, which, when cleansed of adhering acid by washing, resembles soft wax."

On reading this, it occurred to Mr. Tytler, that oil so consolidated might have sufficient firmness to form a candle. After a few necessarily rude experiments, Mr. Tytler adopted an improved mode of preparing what he calls oleocere, the great object being to keep up a uniform heat, and the preventing too high a degree of temperature. He thus describes the process: "I therefore made water boil in a large fish kettle, and mixed a quantity of castor oil and nitric acid in one of those China jars which are employed to hold preserves. Then carefully stopping the mouth to prevent the entrance of vapour, I placed this in the boiling water, and kept the whole upon the fire for about an hour, after which I took it off, and set it by to cool. The effect even exceeded my expectation. It hardened into an uniform mass of no disagreeable colour, and of very tolerable consistency. After a certain number of trials, experience taught me that the best proportion for mingling the substances was eighty parts of oil to one of strong fuming nitric acid, and having increased my apparatus, I continued with this receipt to prepare a considerable number of candles, which answered their purpose sufficiently well."

By degrees, however, he began to experience unaccountable variations in the process; for in spite of all his pains, the oleocere sometimes would not harden, but continue unalterably of the consistence of butter. For a long time he concluded these defects to proceed either from the entrance of watery vapour into the jars whilst boiling, or from the increasing heat of the weather at the time. To remedy this he took every precaution in shutting the jars, and when the process was over, placed them behind a tattie to cool. Still this was to no advantage, and many trials showed that the hardening of the oleocere was a matter of the greatest uncertainty.

Some time afterwards, being placed in more favourable circumstances for conducting his experiments, he adopted another plan, which we give in his own words: "I erected a furnace about four feet from the ground; on this was placed a large iron boiler to serve as a reservoir; immediately adjacent to this first furnace, was built another furnace about half the height of the former, on which was placed a round iron vessel whose side was about ten inches high, and whose capacity was such as to contain seven of the China jars already mentioned. In the side, about two inches below the level of the top of the jars, was fixed a pipe, so that the water might rise to this level and no more, whatever should be superfluous being carried off by the pipe. Having then a quantity of water to boil both in the reservoir on the copper furnace, and in the vessel on the lower, and having prepared a long copper syphon, I placed its short leg in the reservoir, and directed its long leg to the lower vessel, so that a perpetual stream of water should be conveyed from the upper receptacle

to the lower. By this contrivance, the water was perpetually kept boiling, and the quantity in the lower vessel was uniform,—its loss was perpetually supplied by the syphon, and its excess carried off by the pipe. There were placed seven of the China jars, with eighty parts of oil and one of acid. After boiling thus for an hour, they were taken out, seven more placed in their room, and so on for a third time."

We have been thus particular in describing the process, in the hope that those who have plenty of time and opportunity, may repeat Mr. Tytler's experiments, with the view, if possible, of bringing the product to perfection, and rendering it generally useful in those parts where castor oil abounds, but where wax may not be equally procurable and cheap. After all, however, perhaps the most eligible and economical plan will be found to be using the oil simply for the lamp, instead of converting it into oleocere.

Mr. Tytler found that dropping the oleocere from a height on the floor hardened it. He submitted a specimen of the substance to the meeting, which was harder and brighter than what is commonly obtained, but still too soft to form candles for burning in the hot weather; and notwithstanding his laudable perseverance and great trouble, Mr. Tytler does not appear sanguine as to the substance being very likely to prove useful as a substitute for wax in making candles.

The oleocere of cocoa-nut oil, prepared in the same way as that of castor oil, he found never hardened beyond the consistence of butter; its colour was paler, and it might perhaps enter advantageously into the composition of ointments.

[*Asiatic Journal*, No. 1, New Series, p. 66, 67.

Fountains of Fresh and Salt Water.

Marietta, Ohio, March 11, 1830.

TO PROFESSOR SILLIMAN.

Sir,—In the last number of the Journal of Science, I was pleased to observe the remarks of Mr. G. W. Long, upon the spontaneous flow of springs or water from the bowels of the earth. He says, "springs that flow spontaneously, are generally found on the sides of hills, or in the neighbourhood of them; and often in such situations as not to be easily accounted for, and to be, at the same time, objects of great curiosity. The flow of water from the bowels of the earth by boring, excites still more wonder, as the cause appears more hidden from our comprehension. In all these cases the hydrostatic principle which causes the discharge of the water, must be the same; that is, the pressure of a column of water superior to the pressure of the water raised; and in the absence of any other active force to cause this pressure, *it follows that it must arise from a superior fountain head.*" If this be correct on philosophical principles, can a sound reason be given, why a more copious fountain of water should be found by boring at the brow of the hills, from four to nine hun-

dred feet deep, perpendicular, than can be found by boring the same depth one hundred and sixty rods, or three hundred rods, back from the hill on the plain? For such is the fact; *salt licks* on the surface are found all through this western country, and generally at the edge of rising ground. Some of the largest of the *licks* are at the foot of the lowest hills; salt wells were sunk at these places to a great depth, and some in valleys, where strong licks were found, two hundred rods from the hills, which were not *high*, but without success. The wells were abandoned.

The citizens of this country have laid it down as an axiom, founded on experience of some ten or twelve years in the boring of the earth for salt water, to sink their wells at the brow of the highest hills, commencing on a rock, at the surface, if possible. No matter whether there is any appearance of *licks*, or of brackish water, within miles of the place. At the depth of from one hundred and seventy to eight hundred feet they obtain strong salt water, which gushes forth spontaneously, from some wells, six and ten feet above the surface, without being exhausted. In all cases the wells of the greatest depth, and at the brow of the highest hills, have discharged water with the greatest force. The hills are from sixty to two hundred feet high. When we take into consideration the depth of the wells, upon what principle of hydraulics shall we solve this problem?

There are now a great many salt wells, thirty or forty miles from this place, on the Muskingum River, near to Zanesville; and on Leading Creek, in the county of Meigs, several wells have been in operation for years, and make very beautiful salt, which sells at fifty cents per bushel.

I am, respectfully, your obedient humble servant,

NAHUM WARD.

[*Silliman's Journal.*

On making Artificial Pearls.

[From the *Dictionnaire Technologique.*]

THESE are small globules, or pear shaped bulbs, blown in thin glass, and each pierced with two opposite holes, by which it may be strung. These are afterwards prepared in such a manner as to greatly imitate the rounded and brilliant concretions, reflecting the irridiscent colours, which are found in certain bivalve shells, such as the pearl muscle, &c., and which bear the name of oriental pearls.

We can perfectly imitate the brilliancy and reflection of these natural pearls, by means of a liquid, termed essence of pearl, and which is prepared by throwing into liquid ammonia the brilliant particles which are separated by friction and washing from the scales of a small river fish, named the bleak.

These pearly particles, thus suspended in the ammonia, can be applied to the whole interior of these glass bulbs, by blowing it into them; after which, the ammonia is volatilized by gently heating them.

It is said that some manufacturers do not employ the ammonia; but instead thereof, suspend the pearly particles in a solution of isinglass, well clarified, and which they drop into the bulbs, and then turn them in all directions, in order to spread it equally over their interior surfaces. There can be no doubt, that in this mode of applying the pearly mixture, the same success will be obtained as in the before mentioned process, and that it will afford a layer of the same thinness and brilliancy.

It is important, to succeed in the perfect imitation of pearls, that the glass bulbs or pears employed should be of a slight bluish tint, opalized, and be also very thin, and likewise that the glass should contain but little potash, or oxide of lead. In each manufactory of these artificial pearls, there are workmen exclusively employed in the blowing of these glass bulbs, and which indeed requires a great skill and dexterity to succeed well therein; a dexterity, indeed, which can only be acquired by long practice.

The French manufacturers of these artificial pearls have at length attained a degree of perfection before unknown. We must add, that the bulbs are finally filled up with white wax. L***** R.

Alloy for the construction of Pumps and Cocks.

This alloy consists of 4 parts of tin, 4 of zinc, and 1 of antimony; these metals, when fused and well mixed together, have been found well suited to make good pumps. Cock metal is usually an alloy of lead, zinc, and antimony, to which more or less tin is added. The alloy described as good for pumps, is fit for cocks, but one to be mentioned is still better; of the two parts of a cock, viz. the box and plug, the latter should be harder than the former, and therefore contains more antimony. An alloy of 80 parts of tin, with 20 of antimony, is well suited for the plug, and one consisting of 86 parts of tin and 14 of antimony, for the boxes of cocks.

[*Industriel de Brusselles.*

Query respecting Mexican Plumbago.

TO THE EDITOR OF THE JOURNAL OF THE FRANKLIN INSTITUTE.

At page 128, vol. vi. of your Journal, I find in an interesting article on the manufacture of melting pots, &c. the following observation: "the plumbago is Mexican." I should like to know from what part of Mexico it proceeds. Inquiries made from various persons, induce me to believe that plumbago is not an article of exportation from Mexico, and that no mines of it have yet been worked in that country. If any of your readers can set me right, I hope they will do it.

Yours, respectfully,

X.